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ABSTRACT

The role of career and technical education (CTE) was explored through a review of the research on CTE. Research on the following topics was examined: the high school dropout problem; high school graduates' transition to work; unprepared college students; the importance of noncollege careers; things employers really want; CTE's promise; the history of CTE; current CTE programs; public attitudes toward CTE; and CTE in other countries. Research findings regarding the effectiveness of CTE were discussed along with the limitations of research based on national student surveys and studies of self-contained CTE programs. It was concluded that the "college for all" myth is shortchanging those young people who are either uninterested in or unsuited for college and that CTE has the potential to create a better future for these young people. Perpetuating the college-for-all myth, schools are de-emphasizing employers' needs, reducing vocational education, and retiring teachers who have employer contacts. The federal government can reverse these trends, but it must first acquire a stronger influence over CTE programs at the local level. It can accomplish this by sponsoring high-quality research, disseminating the results, developing curriculum and other materials to be used by schools nationwide, and providing technical assistance. (Contains 111 references and 230 footnotes.) (MN)

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The Role of Career and Technical Education:

Implications for the Federal Government

Marie Cohen and Douglas J. Besharov

March 21, 2002

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The Role of Career and Technical Education: Implications for the Federal Government

Marie Cohen and Douglas J. Besharov

Introduction

In recent years, "get a college education" has become the basic advice given to all young people and for good reason. Over the past twenty years, the earnings of young adults who had completed at least a bachelor's degree increased greatly relative to their counterparts who had a high school diploma or the equivalent. Yet, many young people do not go on to college, and others enroll but later drop out. Many of these young people may be unsuited for college—by ability, temperament, or interest. And most jobs—including some very good jobs—do not require a college degree. For some young people, career and technical education (CTE) might provide a route to some of these good jobs. It might even give them a reason to stay in high school and thereby increase the chances that they will eventually get to college.

Many people, however, oppose CTE because they fear it discourages young people from going on to postsecondary education and thus threatens to hold them back from achieving their full potential. Opponents also cite the history of poor and obsolete CTE programs that became a dumping ground for less able students. We believe that these concerns are valid, but that, instead of abandoning CTE programs, we should be trying to improve, upgrade, and modernize.

The federal government could potentially play an important role in this effort by sponsoring high-quality research, disseminating the results of this research, developing curricula and other materials to be used by schools nationwide, and providing technical assistance to states and localities.

The Need for Career and Technical Education

While "college for all" has become the mantra in today's education system, this single-minded focus shortchanges several important groups of students, including those who drop out of high school, those who complete high school and do not continue to college, and those who enter college woefully unprepared and often drop out. CTE could encourage these students—disproportionately poor and minority—to complete high school, ensure that they are better prepared for jobs when they graduate, and perhaps even increase their chances of entering college.

The High School Dropout Problem

Policymakers and concerned citizens have long been worried about the large number of youth who drop out of high school. Young people who do not complete high school tend to have substantially lower employment rates and earnings than their peers who do graduate. In 1997, only 45 percent of recent high school dropouts were employed, as compared with 67 percent of recent high school graduates who were not enrolled in college.[1] Young men who had completed nine to eleven years of education earned only 71 percent of what their peers with a high school diploma or General Education Development (GED) credential earned in 1997, while young female dropouts earned only 63 percent of their peers with degrees.[2] Moreover, high school dropouts are more likely to have children out of wedlock, receive welfare, and go to prison than people who have finished high school.[3]

Despite the increasing importance of a high school degree in the labor market, high school dropout rates have stagnated over the past decade. The proportion of eighteen- to twenty-four-year-olds who have completed a high school diploma or equivalent rose dramatically in the 1950s and 1960s, increased more modestly between 1972 and 1985, and has been fairly stable since then. It stood at 86.5 percent in 2000. Using another measure—the proportion of students who left school each year without successfully completing a high school program—the dropout rate decreased from 1972 to 1987, but has remained relatively unchanged since 1987 at about 5 percent.[4]

Dropout rates are higher in urban areas[5] and among African Americans and Hispanics.[6] Moreover, a recent study shows that the dropout problem is particularly acute in a few hundred high schools in the thirty-five largest cities. The authors found that in almost half of the high schools in these cities, the number of twelfth graders in 1995 divided by the number of entering high school students three or four years earlier (depending on whether the school begins with ninth or tenth grade) was 50 percent or less. This suggests strongly that a high fraction of entering students dropped out before graduating. Moreover, comparisons of this ratio, which the authors call "promoting power," between the 1989-1992 period and the 1992-1995 period indicate "a general

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[1] National Center for Education Statistics, *The Condition of Education 1999* (Washington, D.C.: National Center for Education Statistics, 1999), p. 20, available from: http://nces.ed.gov/pubs99/condition99/pdf/1999022.pdf, accessed January 27, 2002.

[2] National Center for Education Statistics, p. 24.

[3] Philip Kaufman, Martha Naomi Alt, and Christopher D. Chapman, *Dropout Rates in the United States: 2000* (Washington, D.C.: National Center for Education Statistics, November 2001), p. 1, available from: http://nces.ed.gov/pubs2002/2002114.pdf, accessed January 27, 2002; Robert Lerman, "Improving Links Between High Schools and Careers," in *America's Disconnected Youth: Toward a Preventive Strategy*, edited by Douglas J. Besharov, (Washington, D.C.: CWLA Press, 1999), p. 186.

[4]. Kaufman, Alt, and Chapman, p. iii.

[5]. John Wirt, Susan Choy, Allison Gruner, Jennifer Sable, Richard Tobin, Yupin Bae, Jim Sexton, Janis Stennett, Satoshi Watanabe, Nicholas Zill, Jerry West, and Kristin Denton, *The Condition of Education 2000* (Washington, D.C.: National Center for Education Statistics, 2000), p. 45, available from: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid'2000062, accessed January 27, 2002.

[6]. Kaufman, Alt, and Chapman, p. iii.

shift toward weaker promoting power across all schools in the sample, an absolute increase in the number of schools with promoting power of 50 percent or less . . . , and a significant increase in the number of schools with *extremely* weak promoting power."[7]

Why do young people drop out and what can be done to prevent it? The research indicates, not surprisingly, that variables such as socioeconomic status and family structure are strongly related to dropping out. However, data also suggest that schools can have an effect. When school-wide dropout rates are adjusted for differences in the background characteristics of students the variation between schools declines, but there are still widespread differences among schools. Some researchers believe that dropping out is the final stage in a "dynamic and cumulative process of disengagement," both social and academic. Studies have found that dropping out is strongly predicted by student behaviors and characteristics such as absenteeism (the most common indicator of student disengagement), poor academic achievement, and student discipline problems. The relationship between these factors and dropping out suggests that school policies and practices can affect dropout rates by helping students become more engaged in school.[8]

High School Graduates and the Transition to Work

But even graduation from high school is no longer sufficient to ensure a good career. Since the 1950s, a high school diploma has changed from a "valued asset" in the labor market to a "minimum requirement" to access jobs or further education.[9] It is no longer a ticket to a high-paying job, however. Young people just out of high school experience great difficulty finding a job at all or take "dead-end jobs that offer low status, little training, and pay that is too low to support a family."[10] High youth unemployment rates reflect this difficulty that non-college youth have in making the transition to the labor force: only 67 percent of recent high school completers not enrolled in college were employed in October 1997.[11] "And their situations often do not improve much with age. In constant 2000 dollars, the median earnings for male wage and salary workers aged twenty-five to thirty-four with a high school diploma or equivalent decreased from $36,726 in 1970 to $26,842 in 1999, compared to over $31,000 for those with some college and over $42,000 for those with a bachelor's degree or higher. For young women, the median earnings of those with a high school

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[7]. Robert Balfanz and Nettie Legters, *How Many Central City High Schools Have a Severe Dropout Problem, Where Are They Located, and Who Attends Them? Initial Estimates Using the Common Core of Data* (Baltimore, Md.: Johns Hopkins University, 2001), available from: http://www.law.harvard.edu/groups/civilrights/publications/dropouts/dropout/balfanz.html, accessed January 27, 2002.

[8]. Russell Rumberger, *Why Students Drop Out of School and What Can Be Done?* (Santa Barbara, Calif.: University of California, 2001), pp. 6-10, available from: http://www.law.harvard.edu/groups/civilrights/publications/dropouts/dropout/rumberger.pdf, accessed January 27, 2002.

[9]. Kaufman, Alt, and Chapman, p. 1.

[10]. James Rosenbaum, *Beyond College for All: Career Paths for the Forgotten Half* (New York: Russell Sage Foundation, 2001), p. 1.

[11]. National Center for Education Statistics, 1999, p. 20.

degree or equivalent remained extremely low throughout the period with little change, ending at $16,770 in 1999, compared to $21,008 for those with some college and $32,145 for those with a bachelor's degree or higher.[12] For young men, the earnings advantage for a bachelor's degree or higher versus high school grew from 19 percent in 1980 to 58 percent in 1999.[13] For young women, this earnings advantage rose from 52 percent to 92 percent.[14] A number of factors may have contributed to the decreasing returns to a high school degree, including the loss of manufacturing jobs and the increasing importance of computer technology.[15]

Unprepared College Students

The response to the declining rewards of high school has often been to urge all students to go to college. And students are listening. Fifty-five percent of 1998 high school seniors reported that they definitely planned to graduate from a four-year college (up from 36 percent in 1980), while another 23 percent said they would probably do so.[16] The percentage of all high school seniors who expected to complete at least some college rose from 81 percent in 1972 to 95 percent in 1992.[17]

Yet, the actual college performance of many high school graduates falls short of their expectations. Only 63 percent of high school completers enrolled in two-year or four-year college in the fall immediately after high school in 1999, up from 49 percent in 1972.[18] And college completion rates for those who enroll are very low. Two researchers at the U.S. Department of Education reviewed various estimates of four-year college completion rates and concluded that "somewhere around half of the freshmen entering four-year colleges eventually graduate."[19] Two-year college completion rates may be even worse.[20] Using a longitudinal survey of postsecondary students, the National

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[12]. John Wirt, Susan Choy, Debra Gerald, Stephen Provasnik, Patrick Rooney, Satoshi Watanabe, Richard Tobin, and Mark Glander, *The Condition of Education 2001* (Washington, D.C.: National Center for Education Statistics, 2001), p. 137, available from: http://nces.ed.gov/pubs2001/2001072.pdf, accessed February 4, 2002.

[13]. Karen Levesque, Doug Lauen, Peter Teitelbaum, Martha Alt, Sally Librera, *Vocational Education in the United States: Toward the Year 2000* (Washington, D.C.: National Center for Education Statistics, February 2000), p. 59-62, available from: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid'2000029, accessed February 1, 2002.

[14]. Wirt et al., 2001, p. 32.

[15]. *See generally* Richard J. Murnane and Frank Levy, *Teaching the New Basic Skills: Principles for Educating Children to Thrive in a Changing Economy* (New York, New York: The Free Press, 1996), p. 3; David Boesel and Eric Friedland, *College for All? Is There Too Much Emphasis on Getting a 4-Year College Degree?* (Washington, D.C.: National Library of Education, January 1999), available from: http://www.ed.gov/pubs/CollegeForAll/, accessed March 6, 2002.

[16]. Wirt et al., 2001, p. 140.

[17]. Boesel and Friedland, p. 5.

[18]. Wirt et al., 2001, p. 46.

[19]. Boesel and Friedland, p. 14.

[20]. The two-year and four-year college completion rates cited here are not comparable, but using data from the High School and Beyond longitudinal survey of the class of 1982, James Rosenbaum found that high school seniors who plan to get an associate's degree are even less likely to have achieved this goal within ten years than are high school seniors with plans to get a bachelors' degree. *See* Rosenbaum, pp. 66-67.

Center for Education Statistics (NCES) estimated that only 15 percent of students who enrolled in community college in 1995-1996 with the expectation of gaining an associate's degree had achieved that goal by 1998. By that year 6 percent had earned a certificate instead, 39 percent were still enrolled at a two-year or four-year institution, and 41 percent had left without earning a degree or certificate.[21]

Why these dismal college completion rates? A major reason is that many students enter college woefully unprepared, sometimes in need of remedial education. Using the National Educational Longitudinal Survey, researchers concluded that about 11 percent of 1992 high school graduates who were enrolled in four-year colleges were not qualified to attend or only marginally so, while another 13 percent were "minimally qualified."[22] High school grades and standardized test scores are among the best predictors of whether a student completes college. A high school graduate with an average of C+ and total SAT scores of 700 to 849 who enters four-year college has only a 25 percent chance of "eventually" receiving a BA.[23] Only 14 percent of 1982 high school seniors with grade point averages of C or lower who planned on college had succeeded in getting an associate's degree or higher within ten years after high school graduation.[24] Yet, many high school students seem to be unaware of the importance of gaining the skills (attested to by good high school records) needed for college success. In a survey of a random sample of over 2,000 high school seniors throughout the Chicago metropolitan area between 1992 and 1994, Northwestern University sociologist James Rosenbaum found that 44 percent of the students who planned on college agreed with the statement that "Even if I do not work hard in high school, I can still make my future plans come true."[25]

These students are correctly perceiving their chances of *enrolling* in colleges. Kenneth Gray and Edwin Herr of Pennsylvania State University point out that the United States leads the world in the percentage of young people who enter a four-year college, and they attribute this in part to colleges' tendency to admit unqualified students to fill their oversupply of slots and the awarding of financial aid based on need instead of merit.[26] Community colleges are even easier to get into. According to Rosenbaum, "admission standards are now practically nonexistent in community colleges. For example, Illinois high school graduates can attend a community college even if they have D average grades and no college prep courses."[27] These students are apparently

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[21]. Wirt et al., 2001, p. 47.

[22]. Lutz Berkner and Lisa Chavez, *Access to Postsecondary Education for the 1992 High School Graduates* (Washington, D.C.: National Center for Education Statistics, October 1997), p. 28, available from: http://nces.ed.gov/pubs98/access/98105.pdf, accessed January 31, 2002.

[23]. Alexander W. Astin, Lisa Tsui, and Juan Avalos, *Degree Attainment Rates at American Colleges and Universities* (Los Angeles, Calif.: University of California, Los Angeles, Graduate School of Education, Higher Education Research Institute, 1996), as quoted in Boesel and Friedland, p. 40.

[24]. Rosenbaum, p. 66.

[25]. Rosenbaum, p. 61.

[26]. Kenneth Gray and Edwin Herr, *Other Ways to Win: Creating Alternatives for High School Graduates* (Thousand Oaks, Calif.: Corwin Press, 2000), pp. 32-33, 88.

[27]. Rosenbaum, p. 65.

unaware, however, that their chances of completing college are much less than their chances of enrolling.

A study by Kenneth Gray and his colleagues suggests that enrolling in a four-year college may not always be the best course of action for some students. They studied the secondary and post-secondary experiences of all 1991 graduates of seven public high schools in affluent suburban districts. The authors found that upon graduation from high school, almost half the students failed to meet what the authors identified as the minimal criteria for being prepared to do college academic work (defined as having a C average, a combined SAT score of 800, and a minimal sequence of college preparatory courses). The authors then studied the experiences of the 601 "non-competitive" students who did not meet these criteria. A year after high school graduation, about 56 percent of the latter group were full-time students, about half of them in four-year colleges. Of the non-competitive students who went on to higher education, the average freshman year GPA was C; 46 percent reported having to take one or more remedial courses, which typically do not count toward a degree. In light of these mediocre outcomes, it is not surprising that only about half of the non-competitive students who went on to higher education returned as sophomores after their freshman year. The authors also found that 46 percent of these students were receiving financial aid, a sobering statistic in view of their high dropout rate and the possibility that many had taken on loans with the expectation that the higher earnings accruing from college graduation would help to repay them.[28]

The unrealistic plans of many high school students are not cost-free, as James Rosenbaum and Stephanie Alter Jones of Northwestern University point out:

> Thus, over half of college planners are likely to get no economic benefit from college. These students will therefore end up having only their high school diplomas to bring to the labor market. Of course, in high school, students do not anticipate that this will happen (even though it is highly predictable), so these work-bound students are "unidentified." As such, they are less likely to prepare themselves for their subsequent risk of failure, to have back-up plans, to get back-up preparation, or to get help in finding jobs from their high schools.[29]

Moreover, many leave college saddled with burdensome loan repayments. And one of the most important consequences of this unrealistic planning is that many students ignore CTE programs that might be a better choice for them.

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[28]. Kenneth Gray, Wen-Jyh Wang, and Sharon Malizia, "Is Vocational Education Still Necessary? Investigating the Educational Effectiveness of the College Prep Curriculum," *Journal of Industrial Teacher Education* 32 (2) (1995), pp. 6-29.

[29]. James E. Rosenbaum and Stephanie Alter Jones, "Interactions Between High Schools and Labor Markets," in *Handbook of the Sociology of Education*, edited by Maureen T. Hallinan (New York: Kluwer Academic/Plenum Publishers, 2000), p. 416.

The Importance of Non-College Careers

It is important to recognize that most jobs do not require a college degree. Of the total job openings between 2000 and 2010, the Bureau of Labor Statistics (BLS) projects that 70 percent will require no postsecondary education. An additional 9 percent will require an associate's degree or postsecondary vocational award, and only 21 percent will require a bachelor's degree or higher.[30]

Those who say that all young people should go to college often point to the fastest-growing occupations rather than those that generate the most openings.[31] For example, of the thirty occupations that will grow the fastest between 2000 and 2010, 70 percent generally require post-secondary education or training.[32] However, job growth tells only part of the story. First, more jobs are created by the need to replace workers who move up, move on, or retire than by growth.[33] Between 2000 and 2010, for example, the BLS projects that 35.8 million jobs will result from replacement needs, as compared to only 22.2 million from employment growth.[34] Second, a fast-growing job will generate few openings if the original number of positions in that field was small. Thus, of the thirty occupations that will generate the most job openings over the decade, only 23 percent of these occupations will require post-secondary education or training.[35]

Comparing the supply as well as the demand for workers with different types of education and training also suggests an oversupply of college-educated workers and a shortage of those with technical training. It is difficult to compare job openings with the numbers of degrees or other educational credentials awarded for many reasons, including the fact that many fields of study can lead to a wide variety of occupations, while others cannot be precisely matched with any specific occupations. However, Alan Eck of the BLS attempted to compare job openings with degrees or certificates in the relevant area and found that: "In most construction crafts, and in many mechanic and repairer occupations, the number of job openings projected from 1990 to 2005 is much greater than the number of education and training awards received in 1989-90." In the broad group of "precision production, craft, and repair occupations," only 133,000 degrees and awards were projected in 1989-90, in contrast to 455,000 annual average job openings that were expected to occur between 1990 and 2005. Of course, some of these jobs may not require any training except that obtained on the job; Eck, however,

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30. Daniel E. Hecker, "Occupational Employment Projections to 2010," *Monthly Labor Review* 124 (11) (November 2001), pp. 57-82, available from: http://www.bls.gov/opub/mlr/2001/11/art4full.pdf, accessed February 1, 2002.
31. *See, e.g.*, Richard Lynch, *New Directions for High School Career and Technical Education in the 21st Century* (Columbus, Ohio: ERIC Clearinghouse on Adult, Career and Vocational Education, 2000), p. 23, available from: http://www.ericacve.org/mp_lynch_01.asp, accessed February 1, 2002.
32. Hecker, pp. 57-82.
33. Hecker, pp. 57-82.
34. Hecker, pp. 57-82.
35. Unpublished data from Bureau of Labor Statistics website, available from: http://www.bls.gov/asp/oep/noeted/empoccp.asp.

argues that additional training may be appropriate and useful for many of these workers.

While the job openings in the crafts fields far surpassed degrees and awards, Eck found that the number of total degrees and awards appropriate for executive, administrative, and managerial occupations was projected to be approximately about 116 percent of the number of job openings for people with this training. Moreover, the number of degrees awarded for professional specialty occupations was almost twice the number of openings projected for people with such degrees.[36]

As a result of these imbalances between supply and demand, many college graduates may find themselves "underemployed"—working in jobs that do not require a college degree. Eck analyzed respondents' answers in the January 1991 Current Population Survey about whether they needed specific skills or training to get their current jobs. He found that 25 percent of the employees were four-year college graduates, but only 16 percent of them reported needing training in a four-year or longer college program to qualify for their jobs. According to Eck, "this indicates that about one in three college graduates may have acquired training that is not being used in his or her current job."[37] This result is consistent with another BLS study.[38] Some of these students may have done better if they had not spent the money on four-year college and instead obtained high school or postsecondary CTE that could have helped them obtain a better job. Recognizing this reality, an increasing number of college graduates are entering associate's degree or certificate programs in technical fields at community colleges with the hope of finding a better job.[39]

Of course, jobs that actually require more education pay more on average. Jobs requiring a bachelor's degree or higher paid on average $56,553 per year in 2000, compared with $25,993 for those requiring work-related training only.[40] However, a substantial proportion of careers requiring less than a college degree pay more than many jobs that require a college degree. More than 9 million, or 15 percent, of full-time wage and salary workers aged twenty-five and older without a bachelor's degree earned more than $821 per week in 1998Cthe median for college graduates. In this age group, 38 percent of workers without a bachelor's degree earned more than $572 per week, the median for all workers. Even among workers aged twenty-five to twenty-nine, who do not benefit from years of experience and seniority, 24 percent earned $572 or more per week, and about 7 percent earned $821 per week.[41] Among the largest

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[36]. Alan Eck, "Job-Related Education and Training: Their Impact on Earnings," *Monthly Labor Review* 116 (10) (October 1993), pp. 21-38, available from: http://www.bls.gov/opub/mlr/1993/10/art2full.pdf, accessed February 28, 2002.
[37]. Eck, pp. 21-38.
[38]. Eck, pp. 21-38.
[39]. Gray and Herr, pp. 89, 93-94.
[40]. Hecker, pp. 57-82.
[41]. Matthew Mariani, "High-Earning Workers Who Don't Have a Bachelor's Degree," *Occupational Outlook Quarterly* 43 (3) (Fall 1999), p. 11. available from: http://www.bls.gov/opub/ooq/1999/Fall/art02.pdf, accessed February 1, 2002.

groups of workers with less than a bachelor's degree making more than $821 per week are truck drivers (383,000), supervisors and proprietors in sales occupations (365,000), electricians (203,000), production supervisors (269,000), and computer systems analysts and scientists (196,000).[42]

BLS projections provide numerous examples of occupations that do not require a four-year college degree, have minimum earnings in the top half of the earnings distribution, and are expected to generate at least 20,000 annual job openings between 2000 and 2010. These include: registered nurses and computer support specialists usually requiring an associate's degree); carpenters, electricians, and maintenance and repair workers (requiring long-term on-the-job training); truck drivers, wholesale and manufacturing sales representatives, and executive secretaries (requiring moderate-term on-the-job training); first-line retail supervisors, first-line office supervisors, first-line managers in construction and extraction industries, and first-line production managers (requiring experience in a related occupation); automotive service technicians, licensed practical nurses, and welders (requiring a postsecondary vocational award).[43]

Many of these highly paid non-college jobs fall into one of the major occupational categories used by the U.S. Department of Labor—precision production, craft and repair occupations. Only managerial and professional occupations exceeded these occupational groups in their 1999 weekly earnings. And "technicians and related support occupations," many of which also do not require a college degree, had the next highest median earnings.[44] "The nation needs technicians, not a flock of discontented young adults who hold worthless baccalaureate degrees and have no job prospects," argues Kenneth Gray, a proponent of a revitalized CTE based on preparation for two-year college.[45]

BLS data analyzed by economist Alan Eck shed some light on the high earnings of these craft and technical workers. These jobs generally require high levels of training to qualify for the job or to improve skills once on the job. Looking at the utilization of education and training, Eck found that "the proportion of precision production, craft, and repair workers using training (74 percent) and their earnings are exceeded only by those of managerial and professional specialty occupations." The BLS data also show that "for all education groups, earnings are higher in jobs that generally require qualifying training or jobs in which training is taken to improve skills." In addition, "high school graduates who reported that they had both types of training earned slightly more than college graduates with neither type of training."[46]

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[42]. Mariani, pp. 9-15.
[43]. Unpublished data from Bureau of Labor Statistics website, available from: http://www.bls.gov/asp/oep/noeted/empoccp.asp.
[44]. Randy Ilg and Steven Haugen, "Earnings and Employment Trends in the 1990s," *Monthly Labor Review* 123 (3) (March 2000), p. 23; Gray and Herr, p. 105.
[45]. Kenneth Gray, "Vocationalism and the American High School: Past, Present, and Future?" *Journal of Industrial Teacher Education* 33 (2) (1996), p. 91.
[46]. Eck, pp. 21-38.

Anecdotal information illustrates both the availability of jobs and the difficulty of attracting students to CTE. The *Evansville* (Indiana) *Courier and Press* reports that "There are plenty of good—paying, interesting, challenging jobs out there for qualified high school graduates. Many . . . vocational education teachers report that businesses start contacting them in August about hiring students who won't be graduating until May." Unions come to Evansville's North High School to recruit apprentices. "We can't find enough bricklayers," a union representative is quoted as saying, despite the fact that apprentices start at $11.05 an hour, receive a four-year training program at no cost, and receive regular increases in pay.[47] News reports from other areas also indicate that employers are having difficulty filling skilled positions that do not require college.[48] As one employer put it,

> As an employer for the past 33 years I can tell you, as can scores of other employers, that it is easier to find and hire a college graduate without any specific marketable skills than a qualified technician. The skilled technician, when found and hired, generally earns a higher income than many college graduates.[49]

What Employers Really Want

Many researchers have argued that changing business practices and the shift to a service economy from one based on manufacturing have increased the need for basic academic and social skills among front-line workers while reducing the need for specific occupational skills. Others argue that occupation-specific skills are still important.[50] Our knowledge of what employers actually want is based on several types of studies. Among the most important are surveys of employers, ethnographic studies documenting what people actually do on the job, studies in personnel psychology attempting to correlate job performance with various personality characteristics, and econometric studies of returns to different levels of education and other experiences.[51]

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[47]. Patricia Swanson, "Vocational Ed: Many Well-Paying Jobs Await Graduates," *Evansville Courier and Press*, March 12, 2001.

[48]. Peter Simon, "Trade-School Blues: Harsh Audit Inspires Plan for Reform," *The Buffalo News*, February 18, 2001, p. 1A; Brian Kates, "Trade Schools Fall Through the Cracks," *New York Daily News*, July 22, 2001, p. 30; Angela Gonzalez, "Labor Pains: Valley Employers Call For More Vocational Training in Schools," *The Business Journal*, May 11, 2001, vol. 21, no. 33, p. 35; Jill Hoffman, "Vocational Ed Mixes Old, New-Style Skills," *Roanoke Times and World News*, October 13, 2001, p. NRV1; Sherry Jones, "More Jobs than Workers/Skills Unfilled," *Wilmington Morning Star*, April 13, 2001, pp. 1B, 3B.

[49]. Swanson.

[50]. *See, e.g.*, John Bishop, "Expertise and Excellence," Cornell University, Center for Advanced Human Resource Studies Working Paper, Cornell University, Center for Advanced Human Resource Studies, Ithaca, N.Y., 1995, pp. 31-35, available from: http://www.ilr.cornell.edu/depts/cahrs/PDFs/WorkingPapers/WP95-13.pdf, accessed February 1, 2002.

[51]. Cathleen Stasz and Dominic Brewer, *Academic Skills at Work: Two Perspectives* (Berkeley, Calif.: National Center for Research in Vocational Education, May 1999), available from: http://www.nccte.org/publications/ncrve/mds-11xx/mds-1193.html, accessed February 1, 2002.

These studies paint a mixed picture of the types of skills that jobs require. Studies in personnel psychology suggest that general cognitive ability is the strongest predictor of job performance.[52] Econometric analysis suggests that basic academic skills, particularly math skills, are good predictors of wage rates.[53] And surveys and ethnographic work indicate that basic academic skills affect job performance and are important to employers.[54] However, it is important to note that the "academic" skills that employers want for good jobs are often not college-level skills, but rather the ninth- or tenth-grade reading, writing and math skills—skills that should be learned at the high school level, not in college.[55] Surveys and ethnographic studies also suggest that employers place great value on motivation and attitude, as well as generic skills (such as communication) that may or may not be learned in school.[56] There is also evidence from the testing literature and employer surveys that, at least for some occupations, job-specific knowledge and skills are an important factor in employer hiring decisions and job performance.[57] In total, the evidence suggests that employers do not value only academic skills, generic work skills, and work attitudes—but also the kind of specific occupational skills that CTE has traditionally provided. Norton Grubb and his colleagues suggest that there is a contradiction in what employers want:

> On the one hand, employers value highly job-specific skills—skills which are sometimes too specific to be taught in education institutions and which must be learned on the job. They then look for experience in using those skills. . . and for educational programs that are as specific to their production processes as possible. . . . On the other hand, employers complain about the lack of general and "academic" capacities, including the abilities to read, write, and communicate in other ways; the ability to understand and apply math in

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[52]. David Boesel, Lisa Hudson, Sharon Deich, and Charles Masten, *National Assessment of Vocational Education: Final Report to Congress: Volume II: Participation in and Quality of Vocational Education* (Washington, D.C.: U.S. Department of Education, July 1994), p. 143; John E. Hunter and Ronda F. Hunter, "Validity and Utility of Alternative Predictors of Job Performance," *Psychological Bulletin* 96 (1) (1984), pp. 72-98.

[53]. John Bishop, *Schooling, Learning and Worker Productivity* (Ithaca, NY: Cornell University Institute for Labor Relations, 1994); Richard J. Murnane, John B. Willett, and Frank Levy, "The Growing Importance of Cognitive Skills in Wage Determination," *Review of Economics and Statistics* 77 (2) (May 1995), pp. 251-266.

[54]. Harry J. Holzer, *What Employers Want: Job Prospects for Less-Educated Workers* (New York City: Russell Sage Foundation, 1996), pp. 47-50; W. Norton Grubb, Torry Dickinson, Lorraine Giordano and Gail Kaplan, *Betwixt and Between: Education, Skills, and Employment in Sub-Baccalaureate Labor Markets* (Berkeley, Calif.: National Center for Research in Vocational Education, December, 1992), pp. 50-53, available from: http://www.nccte.com/publications/ncrve/mds-04xx/mds-470.html, accessed January 31, 2002; Peter Cappelli and Nikolai Rogovski, *Skill Demands, Changing Work Organization, and Performance* (Philadelphia, Pa.: National Center on the Educational Quality of the Workforce, 1995); Rosenbaum, pp. 114-131; Stasz and Brewer.

[55]. *See* previous endnote, as well as Rosenbaum, p. 267.

[56]. Levesque et al., p. 25; Holzer, pp. 57-62; Grubb et al., pp. 48-49.

[57]. Hunter and Hunter, pp. 72-98; Grubb et al., p. 55; Bishop, pp. 8-21; John E. Hunter, "A Causal Analysis of Cognitive Ability, Job Knowledge, Job Performance, and Supervisor Ratings," in *Performance Measurement and Theory*, edited by Frank Landy, Sheldon Zedeck, and Jeanette Cleveland (Hillsdale, N.J.: Lawrence Erlbaum Associates Publishers, 1983).

unfamiliar settings; and other "basic" capacities that are more likely to be taught in more general school-based programs. . . ."[58]

The Promise of CTE

CTE is one promising strategy for addressing the difficulties faced by high school dropouts and graduates who seek jobs or attend college without adequate preparation. Through contextual learning and connections with adult mentors, CTE can engage students who otherwise might lose interest in school. By providing linkages to employers and a tryout period for new high school graduates, CTE can enhance the chances for finding good jobs that lead to rewarding careers.

Learning in context. Even if employers did not value specific vocational skills, career-related education might be a good way of teaching all of the other skills that are valued by employers: academic skills, computer skills, and basic work behaviors. Teaching these skills in a vocational context may be effective in engaging some students in learning who would not otherwise be so engaged. As Richard J. Murnane and Frank Levy put it, youth apprenticeships and career academies that teach these skills in an occupational context can motivate some students to pursue a "hidden agenda of mathematics, communication, and problem solving."[59] Learning within a career-related context can help students see the relevance of what they are studying, as well as helping them gain confidence in their ability to perform in school and on the job. According to Robert Lerman, "For disconnected students to become invested in their learning, the payoff to learning must become clearer and more immediate and, ideally, must reorient an entire peer group."[60] As two other authors put it, "Students who see the relevance of their curriculum to their own goals and are studying things they have chosen to learn are more likely to have a good reason to come regularly to school and to be willing to put attention and effort into their schoolwork."[61] A career-oriented approach can clarify the connection between schooling and careers for young people who presently see no reason to do well in school. CTE can also help students develop the types of work habits and social skills that are important to employers. Based on interviews with 110 vocational teachers in twelve diverse high schools, James Rosenbaum found that many vocational teachers "use their knowledge of work demands to teach work habits and social skills in their classes."[62]

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[58]. Grubb et al., p 55.
[59]. Murnane and Levy, pp. 121-122.
[60]. Lerman, p. 199.
[61]. James McPartland and Will Jordan, *Essential Components of High School Dropout Prevention Reforms* (Baltimore, Md.: Johns Hopkins University, 2001), p. 4, available from: http://www.law.harvard.edu/groups/civilrights/publications/dropouts/dropout/mcpartland.html, accessed February 1, 2002.
[62]. Rosenbaum, p. 279.

Connections to employers. By improving the formal system of placement in training and jobs, programs that coordinate CTE with internships and other types of work-based learning can reduce the relative disadvantage of poor youth who lack the informal channels to jobs that their middle-class counterparts enjoy. Many employers use word of mouth and other informal channels to hire new employees.[63] Because many non-college-bound students come from disadvantaged families, many have few connections to employers, making the channels provided by school particularly important.[64] CTE teachers often are able to link their students with employers who have good jobs to offer. James Rosenbaum found that some teachers develop trusting relationships with employers and use these relationships to learn employers' needs and match their students to jobs. Moreover, they are sometimes able to persuade employers to hire students whose credentials do not look impressive, or to hire women or minorities into positions formerly held by white men.[65]

Adult mentors. CTE classes and work-based learning programs such as internships can ameliorate the sometimes destructive influence of peer groups by connecting youth with adult mentors. Such connections with caring adults can provide crucial support to a young person trying to resist peer pressure to engage in drug use, membership in a gang, or other self-destructive behaviors. As Robert Lerman puts it, "school-to-career programs lead to a natural mentoring process in which the mentor-trainer has a stake in the success of the apprentice not only at the work site but in academic studies as well."[66]

Tryout period. One survey of employers in four cities found that roughly 70 percent of available jobs require general work experience and about 73 percent require references.[67] A school-based internship gives students an opportunity to earn both the experience and the references they need.[68] Work-based learning programs that typically form part of a CTE program also give young people who might otherwise be adversely affected by negative employer stereotypes a tryout period in which they can demonstrate their potential. Without such a tryout period, minorities and disadvantaged youths are often the victims of negative stereotypes held by employers.

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[63]. Holzer, p. 51.
[64]. Lerman, p. 205.
[65]. Rosenbaum, pp. 233-236.
[66]. Lerman, pp. 205-206.
[67]. Holzer, pp. 54-55.
[68]. Lerman, p. 206.

Background

CTE, originally known as "vocational education," or "voc ed," arose in response to the need for skilled workers in manufacturing industries and the entry of working-class students into high school. But vocational education lost popularity in the United States due to an increased emphasis on academic skills and a belief in college for all, coupled with a perception that vocational education was becoming an educational backwater for the disadvantaged. The development of a "new," retooled CTE may have stemmed the outflow and stabilized enrollment. Nevertheless, it is clear that CTE has an image problem, which is due both to the college- for-all myth and to the perception that it is poor quality education for the worst students. By contrast, in many European countries, CTE is a respected option that is directly linked to good jobs.

History

The earliest roots of CTE can be traced to a movement for "manual education" after the Civil War, which was part of a broader movement to address the social problems caused by industrialization.[69] Some educators began to advocate manual education as a special form of education for the newly freed African-American population in the South, designed to provide educational opportunity within a context of second-class citizenship. Recall leader Booker T. Washington's belief that African-American youth should be trained to become a class of "artisans and yeoman farmers."[70] His critics, led by W.E.B. DuBois, attacked this approach, arguing that African-Americans should be taught the professional skills necessary to succeed in an advanced industrial economy.[71] This early history has left a legacy of antipathy toward CTE among some African-American leaders and parents.[72]

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[69]. Except where otherwise noted, the historical discussion is based on Marvin Lazerson and W. Norton Grubb, *American Education and Vocationalism* (New York: Teachers College Press, 1974).

[70]. Lazerson and Grubb, p. 12.

[71]. Lazerson and Grubb, pp. 12-13.

[72]. *See, e.g.*, Gregory N. Price, "The Idea of a Black University," North Carolina Agricultural and Technical State University Department of Economics and Transportation/Logistics Working Paper, September 1999, p.15, available from: http://www.ncat.edu/~econdept/wp/ideabu.pdf , accessed March 14, 2002, *stating*: "A vocational curriculum degrades men as rational beings and fails to equip them for the demands that a liberal society places on cultivated reason. If presumably educated black men are ill-equipped to participate in a valid intellectual culture, the likely consequence is the arrested development of black America. It is only through the language of the great texts and their manner of organizing reality and contextualizing the big questions, that the best and brightest of black America can continue to secure and expand upon the stake that black America has in liberal democracy." *See also* Susan G. Foster, "Vocational Training for Blacks Debated," *Education Week on the Web*, (Bethesda Md.: Education Week on the Web, December 14, 1981), available from: http://www.edweek.org/ew/ewstory.cfm?slug'01140066.h01, accessed March 14, 2002, *stating*: "Despite a longstanding philosophical disagreement among black educators about the value of vocational-education programs, and their view that racial discrimination prevails in such programs, many now argue that black students should be encouraged to enter the programs as a solution to growing unemployment in their age group. According to vocational educators meeting here last week, black students are not taking advantage of vocational-education programs as they should because such programs are viewed negatively in the schools and by the students' parents."

Vocational education emerged at the turn of the twentieth century as a response to the needs of the business community for skilled labor in industry and to the entry, for the first time, of large numbers of working-class students into high school. Federal aid to vocational education began in 1917, with the passage of the Smith-Hughes Act. The Act required separate state Boards for vocational education, separate funds, teacher preparation and certification, students and curriculum.

Over time, fields of study matching specific industrial categories were developed, each with separate teacher certification programs and state administrators. As a result of vocational education's separation from academic education, it was often not on the "radar screen" of educational policymakers, principals of comprehensive high schools, or school superintendents.[73] Numerous conflicts over whether vocational education should be provided in separate schools or in comprehensive schools were ultimately resolved in favor of the comprehensive approach. Within comprehensive schools, vocational education evolved into a separate "track." Critics of vocational education argue that students were often placed in the vocational track based on the educators' subjective view of their prospects, which may have reflected class perceptions rather than an objective assessment of a student's innate talents.

The focus of federal legislation shifted over the years to accommodate the needs of the economy, from national defense in the 1920s, unemployment reduction in the 1930s, and a shift back to peacetime economic development after World War II. In the 1960s, a new concern about poverty was incorporated into the law with set-asides to serve poor and disabled students and those in economically depressed communities. The Carl D. Perkins Act, passed in 1984, set aside 57 percent of the federal grants to states for disadvantaged groups. In response to this legislative push and to the increasing emphasis on academics among other students, the percentage of poor and disabled students in vocational education increased in the late 1980s and 1990s.[74]

A growing concern about deficiencies in the academic skills of the American workforce gained momentum in the early 1980s with the publication of *A Nation at Risk*, in which the Commission on Excellence in Education called for higher standards and more rigorous academics in elementary and secondary school.[75] States responded by increasing the academic courses required to graduate from high school and to be admitted to state colleges and universities.[76] The new academic focus and increased requirements led to declining vocational enrollments in the 1980s and 1990s.[77] President Clinton urged all students to attend college, and high school officials in some

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[73]. Lynch, pp. 9-10.
[74]. Lynch, pp. 9-10.
[75]. National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform* (Washington, D.C.: U.S. Department of Education, 1983).
[76]. David Boesel and Laurel McFarland, *National Assessment of Vocational Education Final Report to Congress: Volume I: Summary and Recommendations* (Washington, D.C.: U.S. Department of Education, 1994), p. 11.
[77]. Levesque et al., pp. 49-50.

states and communities began to stress college preparation for all students, while reducing or dismantling vocational programs.[78]

In 1994, the U.S. Department of Education issued the final report of the National Assessment of Vocational Education (NAVE), expressing concern that vocational education was becoming an educational backwater, a dumping ground for the economically disadvantaged and the disabled. The writers also expressed concerns about the quality of vocational education, citing "deficits in the formal education of teachers, insufficient homework in vocational courses, and inadequate requirements for vocational program completion."[79] They found that most districts did not meet the federal requirements for a coherent sequence of academic and vocational courses. They argued that current vocational programs were too narrow and should be changed to focus on industries rather than occupations. They also recommended that vocational education should emphasize preparation for post-secondary education (including two-year colleges) for most students.[80]

In response to this and other critiques and the flight of students from vocational education, the vocational education community began to shift its philosophy to incorporate a greater focus on academic skills and preparation for postsecondary education.[81] The Perkins Acts of 1990 and 1998 reflected the new concerns by focusing on program improvement, standards, and academics. The set-asides for special populations were reduced, and states were required to provide data on key performance indicators.[82] In order to avoid the stigma attached to the name "vocational education," the American Vocational Association (AVA) changed its name to the Association for Career and Technical Education (ACTE), urging its members to adopt the new nomenclature.[83]

In the same year that the NAVE report was released, Congress passed the School-to-Work Opportunities Act of 1994 (STWOA). This legislation reflected concern about youth who graduate high school and do not go on to college. The Act stated that the United States lacked "a comprehensive and coherent system to help its youths...make the transition from school to career-oriented work or to further education

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[78]. Rosenbaum, pp. 1, 83; Ferran Mane, "Trends in the Payoff to Academic and Occupation-Specific Skills: The Short and Medium Run Returns to Academic and Vocational High School Courses for Non-College-Bound Students," *Economics of Education Review* 18 (1999), p. 434; Elizabeth Bell, "Hands-on Education," *San Francisco Chronicle*, January 14, 2002, p. B1; Sandy Banks, "Let's Talk Shop About Kids and Careers," *Los Angeles Times*, February 12, 2002, Southern California Living, p. 1.

[79]. Boesel and McFarland, p. 15.

[80]. Boesel and McFarland, pp. 15-16, 21-23.

[81]. Morris Castellano and Samuel Stringfield, *Career and Technical Education Reforms and Comprehensive School Reforms in High Schools and Community Colleges: Their Impact on Educational Outcomes for At-Risk Youth* (Minneapolis, Minn.: National Research Center for Career and Technical Education, 2001), p. 13, available from: http://www.nccte.org/publications/infosynthesis/r&dreport/CTE%20Rfrms_Stringfield.pdf, accessed January 29, 2002.

[82]. Lynch, p. 10.

[83]. Lynch, p. 2.

and training."[84] Congressional interest was spurred, in part, by reports on European apprenticeship systems, which combine school-based instruction and workplace training for occupations that do not require university education.[85] The Act, which expired in 2001, provided funds for school-based learning centered around career majors that would integrate academic and vocational instruction, work-based learning, and "connecting activities such as matching students with work-based learning opportunities."

An early evaluation report found two diverging views of the program's purpose, based on a duality in the Act itself. On one hand, STWOA was based on a concern about non-college-bound youth, and the emphasis on structured programs incorporating career majors and the integration of academic and vocational education reflects this concern. On the other hand, STWOA stressed that programs should be available to all students and authorized many rather nebulous activities such as "career awareness and exploration," and "general workplace competencies," that are designed to provide general background for all youth rather than specific occupational skills.[86] Based on surveys conducted in 1996 and 1997, evaluators found that most local programs—perhaps following the leadership of the federal government—emphasized such general activities, including job shadowing, work site visits, and career awareness classes. More intensive and specific programs, which might benefit non-college-bound students, were less common. In part, this may have been due to the unpopularity of approaches that seem to lead students away from college.[87] By creating a whole new system rather than strengthening CTE—and then by emphasizing services for the broad student population, rather than those who are not college-bound—Congress and the nation's schools missed an opportunity to help non-college youth find their place in a changing economy.

Between 1982 and 1998, the percentage of students who completed a "vocational concentration" (defined as the completion of three or more credits in a single program area such as business) declined from 34 percent to 25 percent. Over the same period, the percentage of students completing a college preparatory curriculum increased from 9 to 39 percent, and the percentage having a "general education preparation" declined from 58 percent to 43 percent.[88] The percentage of

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[84]. U. S. Public Law 103-239, 103rd Congress, May 4, 1994, *School-to-Work Opportunities Act of 1994.*

[85]. Alan M. Hershey, Marsha K. Silverberg, Joshua Haimson, Paula Hudis, and Russell Jackson, *Expanding Options for Students: Report to Congress on the National Evaluation of School-to-Work Implementation* (Princeton, N.J.: Mathematica Policy Research, Inc., February 1999), p. 4, available from: http://www.mathematica-mpr.com/PDFs/Expanding.pdf, accessed February 1, 2002.

[86]. Hershey et al., p. 4.

[87]. Hershey et al.

[88]. *See* David Hurst and Lisa Hudson, *Changes in High School Vocational Coursetaking in a Larger Perspective* (Washington, D.C.: National Center for Education Statistics, 2001), available from: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid'2001026, accessed February 1, 2002. A college preparatory curriculum is defined as the completion of at least four credits in English, three credits in mathematics at the algebra 1 level or higher, two credits in biology, chemistry, and/or physics; two credits in social studies with at last one credit in history; and two credits in a single foreign language. A general education curriculum is one that meets neither the vocational nor college preparatory criteria.

students combining a vocational concentration with a college preparatory curriculum increased from less than 1 percent in 1982 to almost 7 percent in 1998[89]—an increase that may reflect the development of new CTE programs that combine academic and vocational studies.[90] The decline in vocational course taking and concentration may have leveled off in recent years. The proportion of high school graduates who concentrated in a vocational area and the share of vocational credits as a percentage of total credits stayed the same between 1994 and 1998.[91]

Current Programs

Most U.S. high schools offer some CTE. One or more courses identified with CTE are offered in 93 percent of the nation's public comprehensive high schools. Nearly all public comprehensive high schools offer general labor market preparation or family and consumer sciences. About 75 percent offer specific labor market preparation classes. In addition to CTE offered in comprehensive high schools, some states have area vocational centers where students attend part of the day or evening for specialized programs, attending their local comprehensive high school for their general or academic courses. A few states also have full-time vocational high schools that focus on CTE but offer academic and general courses as well. These high schools may be organized under occupational or industry themes and may be called magnet or theme schools.[92] There are also over 1,500 "career academies," which are separate schools, or schools within schools, that prepare students for a cluster of related occupations (such as health care, for example.)[93]

Tech Prep is a special model of CTE that is offered in over half of American comprehensive high schools.[94] A key component of Tech Prep is a formal articulation agreement between high schools and post-secondary institutions that provides for a pathway from one to the other. The original Tech Prep design included a "2 + 2" approach, encompassing grades 11 and 12 plus two years of post-secondary education. Other models have also come into being, including "2 + 2 + 2," which

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[89]. Mario Delci and David Stern came up with the identical result using a different database in *Who Participates in New Vocational Programs? A Preliminary Analysis of Student Data from NLSY97* (Berkeley, Calif.: National Center for Research in Vocational Education, November 1999), p. 26, available from: http://www.nccte.org/publications/ncrve/mds-13xx/mds-1300.pdf, accessed February 1, 2002.

[90]. Delci and Stern.

[91]. Hurst and Hudson. The 1998 data are based on the U.S. Department of Education's 1998 High School Transcript Study. We compared these figures to the 1994 figures cited by Levesque et al.

[92]. Levesque et al., pp. 5-6.

[93]. James J. Kemple and Jason C. Snipes, *Career Academy Impacts for Students at High Risk of Dropping Out* (New York: Manpower Demonstration Research Corporation, December 2000), p. 3, available from: http://www.law.harvard.edu/groups/civilrights/publications/dropouts/dropout/kemple.html, accessed February 1, 2002.

[94]. Mary G. Visher, Doug Lauen, Linda Merola, and Elliott Medrich, *School-to-Work in the 1990s: A Look at Programs and Practices in American High Schools* (Berkeley, Calif.: MPR Associates, Inc., August 1998), p. 9.

incorporates an additional two years at a four-year college; "4 + 2," which encompasses grades 9 to 12 as well as two years of college, and even "4 + 2 + 2."[95]

CTE programs are usually offered as a sequence of courses supplemented by work-based learning experiences.[96] Work-based learning takes two basic forms: classic apprenticeship and work experiences tied to schooling. Classic apprenticeship generally gives trainees some of the rights and benefits of regular employees as well as some special entitlements.[97] School-based work experience, more commonly used in the United States, can take different forms, including job shadowing, service learning and unpaid internships, school-based enterprises, jobs, government-funded training, cooperative education, and paid internships.[98]

In 1998, about one-fourth of high school graduates completed three or more credits in a single vocational area, which is the Department of Education's definition of concentration in vocational education.[99] In addition to the 25 percent of high school graduates who were vocational concentrators, another 39 percent had completed a college preparatory curriculum as defined by the NCES. Thus, the largest group of studentsC43 percent—had completed neither a college preparatory curriculum nor a vocational curriculum.[100] As Kenneth C. Gray and Edwin L. Herr put it, "*Thus, the largest group of students in high school are really in the general curriculum, meaning that they graduate neither prepared for college nor for full-time employment.*"[101]

Certain groups of students are more likely to concentrate in CTE. In 1994, 29 percent of male public high school graduates were vocational concentrators, compared with 22 percent of their female classmates. Disabled and low-achieving students are more likely than others to be vocational concentrators; African-American students are slightly more likely than whites and Hispanics to concentrate in CTE. Rural students are considerably more likely to concentrate in CTE than suburban or urban students. About 32 percent of rural 1994 graduates were CTE concentrators, compared to 22 percent of suburban graduates and 19 percent of urban graduates.[102]

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[95]. Bettina Lankard Brown, "Promising Tech Prep Outcomes," *The Highlight Zone: Research@Work* 3 (2001), available from: http://www.nccte.org/publications/infosynthesis/highlightzone/highlight03/highlight03-techprep.pdf, accessed February 1, 2002.
[96]. Association for Career and Technical Education, *Frequently Asked Questions*, available from: http://www.acteonline.org/faqs/faqs.html, accessed February 1, 2002.
[97]. David Stern, Thomas Bailey, and Donna Merritt, *School-to-Work Policy Insights from Recent International Developments* (Berkeley, Calif.: National Center for Research in Vocational Education, December 1996), p. 25, available from: http://www.nccte.com/publications/ncrve/mds-09xx/mds-950.html, accessed February 1, 2002.
[98]. Lynch, p. 68.
[99]. Hurst and Hudson.
[100]. Hurst and Hudson.
[101]. Gray and Herr, p. 48 (emphasis in original).
[102]. Levesque et al., pp. 59-62.

Quality concerns. CTE teachers and administrators have long complained about "dumping"—the inappropriate placement of low-achieving students into their programs. The disproportionate share of disabled and disadvantaged students in CTE and the increase in their participation as a percentage of all CTE students have exacerbated these concerns. Several factors contribute to dumping. To offset the declines in CTE enrollment, schools have tried to recruit students to CTE. Low-achieving students are often easier to attract, in part because regular programs are more willing to see them go. Federal legislation has also encouraged the placement of "special population" students into CTE. In a survey performed for the 1994 NAVE, 44 percent of all school administrators and 55 percent of vocational school administrators rated the placement of problem students into vocational education programs regardless of appropriateness as a moderate to serious problem in their schools. Moreover, case studies of vocational education programs in local communities yielded many examples of inappropriate placement, especially in vocational schools.[103]

Relegating poorly performing students to CTE programs may make it more difficult to maintain program quality and rigor.[104] Surveys suggest that the vocational classes of the past were often undemanding. Fifty-four percent of students in vocational classes surveyed by National Longitudinal Survey of Youth (NLSY) in 1987 rated these courses as very easy, a much higher percentage than students in any academic subjects.[105] The 1994 NAVE Teacher Survey revealed that only 59 percent of vocational classes assigned any homework. On average, vocational classes were about three-fifths as likely as academic classes to have homework, and the amount of homework assigned in vocational classes was about two-thirds the amount assigned in academic classes.[106] According to John Bishop of Cornell University, the expectations for vocational students were too low, and as a result many vocational graduates lacked the skills that they needed to get good jobs.[107] There is evidence that dumping resulted in the stigmatization of vocational education, making it in turn more difficult to attract good students. In the 1994 NAVE, the Department of Education found numerous examples of a downward spiral in which classes were made easier to accommodate poorer students, prompting a further exodus of higher achievers.[108]

Public Attitudes

From the limited amount of data available, it seems that the public supports the concept of CTE for students who are not bound for college. However, most parents prefer the college option for their own children. Moreover, CTE is seen as a poor quality option for the worst students. Let us examine these attitudes in more detail.

"CTE is worthwhile for those who are not college-bound." Public opinion data on

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[103]. Boesel et al., pp. 25-27, 31.
[104]. Boesel et al., p. 35.
[105]. Bishop, 1995, p. 83.
[106]. Boesel et al., p. 99.
[107]. Bishop, 1995, p. 84.
[108]. Boesel et al., pp. 29-30.

CTE are very limited, but they suggest that most Americans support the concept of CTE for students who are not college-bound. However, CTE appears to have less support among educators and leaders in business and government. For example, in a 1990 Gallup poll, 74 percent of the public would require that students who are not planning to go to college take "vocational training" in school, while only 29 percent would require such training for students who are college-bound.[109] Fifty-seven percent of the public says that it is "absolutely essential" for the schools to teach "practical skills for office or industry," according to a 1995 survey by Public Agenda. But only one of every three leaders in business, government, media, and other sectors agreed, and the authors of the report cite other surveys suggesting that business leaders prefer that the school concentrate on "academics and good work habits."[110]

In Oregon, a 1995 poll showed that 56 percent of the general public and 53 percent of parents agreed that high school students should be "divided into a college-bound track and a professional-vocational track." But only 43 percent of educational administrators and 28 percent of teachers agreed with this statement. Moreover, 67 percent of the general public, 68 percent of parents, and 72 percent of employers agreed that high schools should Abe expected to provide the skills necessary for students to succeed in the workforce without a college education."[111] Interestingly, in a 1996 Gallup poll, 67 percent of people surveyed thought that "more vocational or job training courses in public schools" would be very effective in reducing violence in the public schools, and another 25 percent thought it would be somewhat effective in reducing violence.[112]

"But my child should go to college." Despite favoring the general concept of CTE for youth who are not college-bound, most parents seem to prefer college and a traditional academic curriculum for their own children.

- Ninety-eight percent of public and private school parents polled by Gallup and Phi Delta Kappa International in 1995 said they would like their oldest child to go on to college after graduating from high school; 82 percent of public and 85 percent of nonpublic school parents thought that their child would indeed attend college.[113] Similarly, 83 percent of parents in a 1995 Public Agenda poll said they expected their own children to attend college.[114]

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[109]. Stanley M. Elam, "The 22nd Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," *Phi Delta Kappan* 74 (September 1990), pp. 41-55.
[110]. Jean Johnson, *Assignment Incomplete: The Unfinished Business of Education Reform* (New York City: Public Agenda, 1995), p. 22.
[111]. The Nelson Report, *Oregon Department of Education, Oregon Educational Act for the 21st Century, School to Work System* (Salem, Ore.: Public Affairs Counsel, May 18, 1995). Administrators and teachers were not asked the second question.
[112]. Stanley M. Elam, Lowell C. Rose, and Alec M. Gallup, "The 26th Annual Phi Delta Kappa/Gallup Poll of the Public's Attitudes Toward the Public Schools," *Phi Delta Kappan* 76 (September 1994), pp. 41-56.
[113]. Stanley M. Elam and Lowell C. Rose, "The 27th Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," *Phi Delta Kappan* 77 (September 1995), pp. 41-56.
[114]. Johnson, p. 32.

- A 1998 Public Agenda poll found that 86 percent of Americans believe that "high school graduates should go on to college because in the long run they'll have better job prospects." This is an increase from 79 percent in 1993.[115]

- Eighty-two percent of teens believe they need a college degree to get a good job, and the majority seem determined that they will follow this path.[116] The percentage of all high school seniors who expected to complete at least some college rose from 81 percent in 1972 to 95 percent in 1992.[117]

Lack of accurate labor market information may contribute to the high level of college expectations. In Washington State, most respondents to a telephone survey of 603 adults conducted in December 1996 estimated that more than 40 percent of today's jobs require a four-year college degree, including nearly a quarter who put that figure at more than 60 percent. By contrast, the State Employment Security Department estimated that only about 19 percent of jobs required a college degree.[118]

A general prejudice against blue-collar jobs is part of the problem. The Evansville *Courier and Press* interviewed the son of an associate dean of a science and engineering school, who had to battle his family and teachers in order to go to his high school's CTE program. He was too smart, and his SATs too high, to be an auto mechanic, he was told.[119] The last high school bricklaying program in Northern Virginia closed down in 2000 because students lacked interest, and enrollment in bricklaying programs is declining around the area, despite the fact that most skilled masons earn more than $22 an hour.[120] As one CTE administrator put it, "society has defined success as clean fingernails and that's hurting people."[121]

Despite the desire of most parents that their children go to college, a majority of the public seems to believe that too many unqualified students are entering four-year institutions. For example, based on a 1993 random sample telephone survey of residents of the continental United States, Public Agenda concluded that 77 percent of Americans think it is a problem that many young people are "wasting their time and money in college because they don't know what to do with their lives." Moreover, in another poll, 54 percent of Americans said that it was a problem that "too many people

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[115]. John Immerwahr, *The Price of Admission* (San Jose, Calif.: The National Center for Public Policy and Higher Education, Spring 1998), p. 4.
[116]. Jean Johnson and Steve Farkas, *Getting By: What American Teenagers Really Think About Their Schools* (New York City: Public Agenda, 1997), p. 12.
[117]. Boesel and Friedland, p. 5. Data are from the National Longitudinal Study of 1972 and the National Education Longitudinal Study of 1988, Second Followup.
[118]. Washington State Workforce Training and Education Coordinating Board, *Education and Workforce Issues: Public Attitudes and Awareness, 1997* (Olympia, Wash.: Washington State Workforce Training and Education Coordinating Board, 1997), p. 17.
[119]. Swanson.
[120]. Jennifer Lenhart, "A Few Students Shy of a Load: N. Va. Schools' Last Bricklaying Program Dies for Lack of Interest," *The Washington Post*, June 19, 2000, p. B1.
[121]. Tracy Turner, "Vocational Careers in Spotlight at Anthis; Open House at Center Seeks to Change Public Perception," *Fort Wayne News Sentinel*, February 13, 2001, p. A1.

are going to college instead of alternatives to college where they can learn trades like plumbing or computer repair."[122]

Many leaders in business, education, and government agree with the public that too many young people are going to college. Half of faculty members, 60 percent of business leaders, and slightly less than half of higher education administrators and government officials surveyed by Public Agenda in 1998 agree that "many young people are wasting time and money in college because they don't know what else to do." Moreover, nearly 90 percent of the entire group said they "want to make trade and technical school a more appealing option for high school graduates who are not qualified for college."[123]

ACTE offers poor quality education." In addition to preferring the college preparatory option, many parents, students and educators seem to have a negative view of CTE, seeing it as "dumbed down" and a "dumping ground" for poor students.[124] The National Dissemination Center for Career and Technical Education reported that, in a series of conference calls with CTE administrators, teachers, representatives of unions and business with an interest in CTE, and other interested parties to identify the major needs of CTE in the year 2000, participants most often mentioned the need to improve the image of CTE. "The underlying theme was the need to change the perception that CTE offers an inferior curriculum, appropriate only for those students who cannot meet the demands of a college preparatory program."[125] CTE's image problem has been recognized by the American Vocational Association (now ACTE), which dedicated three journal issues to this topic between 1987 and 1997.[126]

Guidance counseling and job placement. Guidance counseling practices also contribute to the overemphasis on college. While counselors in the 1960s saw their role as selecting only a limited number of students who should go to college, recent research suggests that they now advise college for almost everyone, steering students

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[122]. John Immerwahr and Steve Farkas, *The Closing Gateway: Californians Consider Their Higher Education System* (San Jose, Calif.: California Higher Education Policy Center, September 1993), p. 19.
[123]. John Immerwahr, *Taking Responsibility: Leaders' Expectations of Higher Education* (San Jose, Calif.: National Center for Public Policy and Higher Education and Public Agenda, 1999), pp. 10-11. The questionnaire specified that "college" referred to both two-year and four-year institutions, so it is not clear what the respondents meant by "trade and technical school." While some of the four-year-college staff may have been thinking of two-year schools, some respondents may have been thinking of trade schools that are not colleges.
[124]. Lynch, p. 18; A-Plus Communications and Jobs for the Future, *Understanding Attitudes About School-to-Career: A Review of Public Opinion Data* (Arlington, Va.: A-Plus Communications, 1997), p. 8.
[125]. Morgan V. Lewis, *Major Needs of Career and Technical Education in the Year 2000: Views from the Field* (Columbus, Ohio: National Dissemination Center for Career and Technical Education, The Ohio State University, April 2001), p. vi., available from: http://www.nccte.org/publications/infosynthesis/r&dreport/Major%20Needs%20of%20CTE.pdf, accessed January 29, 2002.
[126]. Deborah Bingham Catri, *Vocational Education's Image for the 21st Century* (Columbus, Ohio: ERIC Clearinghouse on Adult, Career and Vocational Education, 1998), available from: http://www.ericacve.org/docgen.asp?tbl'digests&ID'41, accessed February 1, 2002.

away from CTE and blue-collar jobs.[127] The conference calls just described yielded comments like "It is a common practice that, all too often, counselors and school administrators view career-technical education as a >dumping ground' for problem or low achieving students, especially minorities." Some of the employers reported that they had attempted to interest students in preparing for their industries through career days but that interested students were often discouraged by high school counselors from pursuing CTE.[128] Evidence from longitudinal surveys indicates that between 1982 and 1992, the percentage of seniors who said their guidance counselors urged them to go to college doubled.[129] Most businesspeople interviewed for a recent report on the future of CTE "seem to believe that teachers and counselors guide students to consider four-year colleges as the *only* option to a good career and a successful life. . ."[130]

A survey of twenty-seven counselors in eight Chicago metropolitan area high schools between 1992 and 1995 found that most of the counselors urged all students to attend college, even when they were not interested and did not like school or had extremely poor grades. Counselors did not tailor their recommendations according to students' achievements or interests. Moreover, the majority of counselors were "reluctant to confront students who had unrealistic expectations regarding college or job plans." Instead, they allowed students to carry out their plans and let them find out for themselves that they were unrealistic, "regardless of the costs to the student in terms of lost time, money, and planning effort." The researchers attribute counselors' reluctance to provide realistic advice to pressure from parents who want their children to go to college. However, this study was based on a very small sample in a limited geographical area, so it cannot be assumed to represent schools in general. Moreover, it reports on counselors' self-reported behaviors, not observation of their actual behaviors.[131]

Not only do many guidance counselors stress college for all, but they seem to be poorly equipped to help students who are not interested in college find jobs. Many guidance counselors get no training in job counseling, have little knowledge of the job market for high school graduates, and lack contacts with employers.[132] It is thus not surprising that research suggests that guidance counselors rarely provide any sort of vocational guidance.[133] Moreover, the literature suggests that teachers—even vocational teachers—do not generally see dealing with employers as one of their responsibilities

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[127]. James E. Rosenbaum, Shazia Miller, and Melinda Krei, "Gatekeeping in an Era of More Open Gates: High School Counselors' Views of Their Influence on Students' College Plans," *American Journal of Education* 104 (August 1996), pp. 257-279. *See also* Kates; Beverly A. Carrol, "Leaders: Vocational Training Needs Tout," *Chattanooga Times/Chattanooga Free Press*, October 16, 2001.

[128]. Lewis, p. 7.
[129]. Gray and Herr, p. 24.
[130]. Lynch, p 50.
[131]. Melinda Scott Krei and James E. Rosenbaum, *Career and College Advice to the Forgotten Half: What Do Counselors and Vocational Teachers Advise?* (Evanston, Ill.: Northwestern University, 1997); Rosenbaum, Miller and Krei; Rosenbaum, pp. 88-107.
[132]. Rosenbaum, p. 93.
[133]. Rosenbaum, p. 93.

and are not encouraged to do so by schools.[134] In addition, most of the American employers surveyed by James Rosenbaum do not look to schools for help in finding new employees. Many report that they do not trust most teachers to be candid about their students' shortcomings.[135] Moreover, "because job placement falls squarely outside American definitions of a teacher's professional responsibilities, there is neither an incentive to reward them for this placement work nor relief from other job duties."[136]

Some employers do hire through schools, but this is the exception and not the rule. A 1987 survey that asked owners of independent businesses about the jobs for which they had hired the most people in the past two or three years suggested that about 10 percent of these new hires were referred by their schools: about 6 percent through vocational teachers and 4 percent through other teachers.[137] Another survey suggests that 3 to 5 percent of non-college-educated new hires are hired through schools.[138] About 9 percent of the 1982 high school graduates in the High School and Beyond survey got jobs through their schools.[139] There is evidence that many vocational teachers in America cultivate employers and arrange job placements for their students, even though they may not be required or even encouraged to do so.[140]

The educational context. As described earlier, the increased emphasis on standards and testing has been blamed for driving students out of CTE. According to a report issued in January 2001, forty-nine states have statewide academic standards for what students should know and be able to do in at least some subjects. Fifty states test how well their students are learning; and twenty-seven hold schools accountable for results, either by rating the performance of all their schools or identifying low-performing schools. Twenty-three states are in some stage of implementing a graduation exit exam, and another three have an exam requirement that can be waived for certain students or schools.[141] Three states require students to pass state tests to be promoted to the next level in specified grades, and four more will be doing so by 2003.[142]

Many CTE supporters argue that these course requirements and tests leave students less time for CTE.[143] In fact, the proliferation of testing and standards may

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[134]. Rosenbaum, p. 219.
[135]. Rosenbaum, pp. 135-137, 141.
[136]. Kathryn Newman, *No Shame in My Game* (New York City: Alfred A. Knopf and the Russell Sage Foundation, 1999), p. 278.
[137]. John Bishop, "Improving Job Matches in the U.S. Labor Market," in *Brookings Papers on Economic Activity: Microeconomics*, edited by M. N. Bailey (Washington, D.C.: The Brookings Institution, 1993), Table 6.
[138]. Holzer, p. 52.
[139]. Rosenbaum, p. 199.
[140]. Rosenbaum, pp. 219, 223-236.
[141]. National Governors' Association, *Graduation Exit Exam Matrix*, January 8, 2002, available from: http://www.nga.org/center/divisions/1,1188,C_ISSUE_BRIEF^D_3007,00.html, accessed February 19, 2002.
[142]. Lynn Olson, "Finding the Right Mix," in *Quality Counts 2001: A Better Balance* (Bethesda, Md., Education Week on the Web, 2001), available from: http://www.edweek.org/sreports/qc01/articles/qc01story.cfm?slug'17intro.h20, accessed February 1, 2002.
[143]. Rowena Coetsee, "Supporters Want to Revive Vocational Classes," *Contra Costa Times*, July 26, 2001; Hoffman.

threaten some of the most promising new CTE programs. For example, the evaluators of nine career academies fear that these institutions will have to choose between aligning their curricula and instructional strategies with rising academic standards and high-stakes tests and investing in an improved academic/vocational curriculum. Career academy advocates have complained that current assessment instruments do not capture the kinds of competencies that academy students may gain.[144]

In the 1994 NAVE final report, David Boesel and Laurel McFarland reported that most vocational educators believe that increased academic requirements for high school graduation have reduced vocational enrollments by leaving students less time for vocational courses. Boesel and McFarland, however, argue that statistical analysis does not support this view. Districts that had higher graduation requirements displayed no greater decline in vocational enrollments than other districts. Moreover, the vocational education enrollment decline started before the school reform movement. The authors believe that other factors, such as reduced labor market demand for traditional vocational skills, may have been responsible for the vocational education enrollment decline.[145] Whether or not academic requirements were responsible for past declines in vocational education enrollment, it seems clear that these requirements are making it more difficult now for students to pursue CTE programs.

In at least New York City and Massachusetts, CTE advocates have lobbied for exemptions for CTE students from graduation exams.[146] They have so far been unsuccessful, although the New York State Board of Regents did vote in 2001 to give CTE students more flexibility in the kinds of courses they may take to meet the new higher graduation standards that were adopted five years earlier. CTE students would be allowed to take one less course in each of the four core academic subject areas of English, math, social studies and science, and to replace these courses with four electives combining these subjects with their CTE work. Schools were given the option, but not required, to develop such integrated courses. The new policy was adopted in response to complaints about the decision made five years ago to require all high school seniors to pass at least five state exams.[147]

CTE in Other Countries

It is instructive to look at the experience of European systems and Japan, which have been much more rigidly "tracked" than the American system. Most of these systems have historically been stratified into an academic system for elite students and a vocationally oriented system for the working class. Most European systems generally grant occupationally related secondary school credentials. Students in Europe are more likely to receive secondary school credentials that are relevant to specific occupations than are American students. Nearly one-fourth of American adults have a university level degree, in contrast with only 13 percent of German adults and 9 percent of French

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144. Kemple and Snipes, pp. 11-12.
145. Boesel and McFarland, p. 29.
146. Kates; Emily Shartin, "Demand Surging at Vocational Schools," *The Boston Globe*, July 22, 2001, p.1.
147. Kate Zernike, "Graduation Rule Adjusted for Vocational Students," *New York Times*, February 7, 2001.

adults.[148] Where CTE is more well-developed, young people may choose it rather than attempting to acquire more education to get ahead in the labor market.[149] Yet, Americans with higher degrees may not necessarily do better than similar Europeans without university training. In societies with greater proportions of people with university degrees, the credential required for a given job may rise as well.[150]

Germany offers perhaps the clearest example of a highly stratified or tracked system.[151] After four years of primary school, students are sorted into three tracks. About a third are directed to Gymnasium, which offers nine more years of general schooling and prepares students for the university. About 70 percent are directed to one of the other two tracks—the Hauptschule, which provides five more years of education, or the Realschule, which provides six more years of education. These assignments are based on teacher evaluations, which most parents accept. If they object, the school must follow their wishes, but the pupils must pass their yearly final exams or else shift into the track that was originally proposed. After completing these programs, Hauptschule and Realschule students move on to CTE via the "dual system"—a combination of apprenticeship training and part-time schooling. The apprentice generally spends one or two days per week in the classroom and three to four days per week in a firm. The state pays the vocational schooling costs and the employer pays a reduced wage. The vocational training system prepares students for a highly structured labor market. There are 498 officially qualified occupations, each with its requirements for apprenticeship or school-based vocational education and with a defined wage structure determined by industry-wide collective bargaining agreements. Workers can rarely progress beyond the ceiling of the occupation for which their education qualifies them. There is an alternate route to the university for apprentices who want to change career paths, but it is open only to those who perform well in the school-based portion of the apprenticeship.[152]

As Yossi Shavit and Walter Muller have put it, many education systems face a conflict between two goals: "On one hand, they wish to equalize the life chances of their students, whereas on the other hand, they are expected to prepare them for positions in a differentiated labor market."[153] The distinctions between the American and German systems illustrate this conflict. A major drawback of the German system is that many opportunities are closed off to children at a relatively young age—between ten and twelve. If not selected for the Gymnasium, they are unlikely to achieve a higher-level

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[148]. Alan Kerckhoff, "Transition from School to Work in Comparative Perspective," in *Handbook of the Sociology of Education*, edited by Maureen T. Hallinan (New York City: Kluwer Academic/Plenum Publishers, 2000), pp. 455-458.

[149]. Yossi Shavit and Walter Muller, "Vocational Secondary Education, Tracking, and Social Stratification," in *Handbook of the Sociology of Education*, edited by Maureen T. Hallinan (New York City: Kluwer Academic/Plenum Publishers, 2000), p. 446.

[150]. Kerckhoff, p. 455.

[151]. Kerckhoff, p. 456.

[152]. Jeylan T. Mortimer and Helga Kruger, "Pathways from School to Work in Germany and the United States," in *Handbook of the Sociology of Education*, edited by Maureen T. Hallinan (New York City: Kluwer Academic/Plenum Publishers, 2000), pp. 475-497.

[153]. Shavit and Muller, p. 438.

professional or managerial position. At the age of thirteen to fifteen, these young Germans must commit to the occupation at which they may spend their entire lives.[154] Moreover, the German system may not be as effective in the face of rapid technological or economic change. It takes a long time to change official educational programs and curricula, and young people may not be well prepared to explore new opportunities or acquire new skills.[155]

On the other hand, German students who do not get into Gymnasium are unlikely to feel disheartened. "To become a qualified worker is completely normal and acceptable in Germany, worthy of striving and of youthful aspiration."[156] Moreover, the German system "encourages, one might even say, forces the student to be actively engaged in an intensive process of acquiring vocationally relevant information and planning for occupational entry."[157] The German system also gives non-college-bound students more incentives to stay in school and do well—in contrast to the United States, where "[l]acking any clear vocational payoff, youths who are not college-bound often underutilize the educational resources that are available to them, underachieve, and become alienated from school."[158] Moreover, these tracked, vocationally oriented systems, particularly those where the curriculum is standardized, ease the transition from school to work by allowing employers to gauge the qualifications of young people seeking employment. As a result, young people in these societies are less likely to suffer the early "career turbulence" seen in the U.S. as young people move from job to job looking for a good fit.[159]

In many other nations, teachers have formal responsibilities to help place their students in jobs.[160] Japan is particularly notable in this regard. Schools have longstanding relationships with certain employers "who offer the same number of jobs to a school each year and expect schools to nominate seniors of dependable quality for those jobs." Students apply for their school's nomination. A committee of teachers nominates and ranks students for job openings. The employers select from the nominated students. Because employers rely so heavily on school nominations, fewer than 3 percent of all students have to apply to three or more employers. Teachers use grades as their primary criterion for nominating students, thereby giving students an incentive to do well in school. The system encourages both parties to behave in a way that maintains the relationship. "Schools must select students who satisfy employers in order to continue receiving job allocations in the future, and employers must continue hiring a school's graduates in order to maintain a stable source of employees of dependable quality."[161]

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154. Mortimer and Kruger, p. 487.
155. Mortimer and Kruger, p. 493.
156. Mortimer and Kruger, p. 489.
157. Mortimer and Kruger, p. 492.
158. Mortimer and Kruger, p. 493.
159. Kerckhoff, pp. 464, 466.
160. Rosenbaum and Jones, p. 430.
161. Rosenbaum, pp. 13-15.

What the Research Says about the Effectiveness of CTE

The research on CTE falls into two major categories: (1) longitudinal quantitative studies using major national surveys of students (2) and studies of self-contained CTE programs. The national student surveys were designed to capture all kinds of information about education, not specifically CTE. The latest of these surveys gathered information on students who were in eighth grade in 1988, while the others occurred substantially earlier. The second set of studies focuses on self-contained CTE programs, such as career academies, career magnets, and apprenticeship programs—most of them specialized schools or programs within schools. These studies, which tend to be more recent than the student surveys, generally suggest that CTE can reduce dropout rates and improve economic outcomes for some young people. These modest results, however, may mask major improvements for some young people or some specific programs.

Limitations of Research Based on National Student Surveys

Most of the analyses of student outcomes use the large databases of one or more of three major national surveys conducted by the NCES: the National Longitudinal Study of the High School Class of 1972 (NLS-72), High School and Beyond (HSB), and the National Education Longitudinal Study of 1988 (NELS:88). All of these surveys used a two-stage sample design, selecting first schools and then a sample of students from each school.[162] High school transcripts were collected for the respondents. A few studies used the NLSY, conducted by the BLS, a national probability sample of young people who were between the ages of fourteen and twenty-one in the fall of 1978. These studies compare outcomes for vocational students to outcomes for other students, often using regression analysis to control for differences between vocational students and others. There are several methodological problems with this literature, however.

- **Selection bias.** Because the studies were not based on random assignment of students between different tracks, one cannot be sure that the "effects" they found were not due to unmeasured differences between the students in the different tracks rather than to the tracks themselves. If factors such as motivation and ability affected both enrollment in vocational education and later outcomes such as dropping out and labor market success, selection bias can cloud the results. Serious studies attempted to remove such biases by statistically controlling for such factors as ability and motivation. It is difficult or impossible, however, to measure and control for attributes like motivation, and information on ability may not be available. Unfortunately, many data sets, such as HSB senior cohort data and the NLS-72, lack any prior measures of ability.[163]

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[162]. Thomas S. Dee, William N. Evans, and Sheila E. Murray, "Data Watch: Research Data in the Economics of Education," *Journal of Economic Perspectives* 13 (3) (Summer 1999), pp. 205-216.
[163]. Boesel et al., pp. 132-133

- **Lumping together of diverse programs.** Studies rarely distinguished between different types of vocational education. Thus, they lumped together programs that varied greatly in content, quality, and the types of employment opportunities for which they prepared students.[164] If some of these types of programs were much more effective than others, then failing to distinguish between them may have produced misleading results.

- **Measurement of vocational education participation.** To measure participation in vocational education, some researchers used the number of vocational courses taken, and others used participation in a curricular "track" or area of concentration—academic, vocational, or "general" (neither academic nor vocational), based on the researchers' definitions of these tracks. This categorization might be based on student self-reports, school classifications, or the researchers' review of transcripts. Each of these methods of determining curriculum, however, presents its own problems. Self-reported data, whether on track or on courses, are often inaccurate, partly because students have difficulty differentiating academic from vocational subjects.[165] Students' reports of their track seems to be most often inflated, resulting in an exaggerated number of students reported as completing academic programs and an artificially low proportion completing vocational programs.[166] On the other hand, a school's determination of track may not be comparable across schools. And transcript-based classifications reflect the judgment of the researcher who may be unaware of the context of a particular school or program.[167]

- **Comparisons.** Studies differ not only in how they measure participation in vocational education but also in the alternative to which they compare it. While some studies compare a vocational concentration to a "general curriculum," others compare vocational concentration or course-taking to academic concentration or course-taking. Regardless of whether one or the other comparison is correct, the variation makes cross-study comparisons difficult, if not impossible.

- **Timing.** Researchers also differed as to what grade level they used to categorize students as vocational students. Some used tenth grade, some used twelfth grade. Each of these methods has its problems. Using the senior year ignores the effect of track placement before that year, which may be significant. Using the tenth grade does not take into account that many students shifted among tracks after tenth grade and that many vocational programs did not start until eleventh grade.[168] At least two studies have shown that dropout findings change

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[164]. Richard Arum and Yossi Shavit, "Secondary Vocational Education and the Transition from School to Work," *Sociology of Education* 86 (July 1995), pp. 187-204.
[165]. Boesel et al., p. 132; Arum and Shavit, pp. 191, 193.
[166]. Arum and Shavit, p. 193; Boesel et al., p. 132.
[167]. Delci and Stern, p. 11.
[168]. Arum and Shavit, p. 192.

based on when curricular track is measured.[169]

- **Age of study.** Many of these studies are quite dated. Most of them contain data collected in the 1980s for people who may have graduated from high school several years earlier. There have been many changes in CTE since then, such as the new emphasis on integrating academic with vocational courses and a proliferation of new approaches such as career academies. In addition, changes in the economy may have changed the value of different types of training in the labor market.[170]

Limitations of Studies of Self-Contained CTE Programs

A second set of studies looks at individual CTE programs or groups of programs, such as career academies or other freestanding schools or schools within schools. By comparing students in these programs to a matched comparison group or a randomly selected control group, these studies attempt to assess the impact of the specific program under study. The selection bias that weakens the first set of studies also presents a problem for those that did not use a randomly selected control group. The apparent impacts may be due to unobserved differences between the groups, rather than the type of education received. Only the few studies that used a randomly selected control group allow researchers to assert with confidence that the outcomes observed are due to the programs.[171] Another problem is that some of the programs studied combined a vocational emphasis with other features designed to retain students, such as small school size, small class size, and more personal attention, making it impossible to determine the effect of the career and technical curriculum *per se*.[172]

Findings

Research on CTE looks at a number of different outcomes, including dropout, school performance, educational attainment, labor market success, and risky behaviors. Research on each outcome is discussed separately below.

Dropout rates. In general, the more credible studies using large databases

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[169]. James Kulik, "Curricular Tracks and High School Vocational Education, in *The Quality of Vocational Education: Background Papers from the 1994 National Assessment of Vocational Education*, edited by Adam Gamoran (Washington, D.C.: U.S. Department of Education, 1998), p. 87.

[170]. Boesel et al., pp. 132-133.

[171]. New York City used a lottery to randomly select students for the magnet schools, but since a large proportion of lottery losers were actually accepted for a career magnet and many lottery winners did not attend a career magnet, the random assignment design was severely compromised. *See* Robert L. Crain, Anna Allen, Robert Thaler, Debora Sullivan, Gail L. Zellman, Judith Warren Little, and Denise D. Quigley, *The Effects of Academic Career Magnet Education on High Schools and their Graduates* (Berkeley, Calif.: National Center for Research in Vocational Education, 1999), available from: http://vocserve.berkeley.edu/abstracts/MDS-779/, accessed February 2, 2002.

[172]. Robert B. Pitman, "Social Factors, Enrollment in Vocational/Technical Courses, and High School Dropout Rates," *Journal of Educational Research* 84 (5) (May/June 1991), p. 288.

suggest that CTE has a modest positive effect on high school completion.[173] More specifically, taking a vocational course or being on the vocational track as compared to the general track seems to increase students' chances of completing high school.[174] A recent study using NELS:88 data found a relationship between course-taking patterns and dropout rates. "After controlling for prior achievement, grades, and student background characteristics, the risk of dropping out is estimated to be at its lowest near the point at which a student completes three Carnegie units of CTE for every four Carnegie units of academic subjects." As the CTE-to-academic ratio gets smaller or larger, the risk of dropping out is estimated to increase. The relationship seems to be strongest for those who are at the highest risk for dropping out.[175] The results of studies of individual CTE programs are mixed. Some of the California Peninsular Academies (not a random assignment study) and the Dropout Prevention and Re-entry Projects in Vocational Education were found to reduce dropout rates among their students.[176] The career academies were found to have no effect on high school completion a year after scheduled graduation, and students attending the New York City career magnets had a higher dropout rate than comparison students attending comprehensive high schools.[177]

Student achievement. The number of vocational credits that public high school graduates earn is inversely related to their grade point averages.[178] A crucial question is whether this difference is due mainly to pre-existing differences between the students or to their participation in CTE. It is known that vocational students have traditionally started out with lower academic ability because lower-achieving students have chosen, or been encouraged to pursue, a vocational program.

In order to estimate the real impact of vocational education, researchers working with national longitudinal survey data have used regression analysis to control for factors, such as initial ability, motivation, and family background, that could affect

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[173]. For two reviews of the literature, see Kulik and Boesel et al., pp. 107-130.

[174]. The effects of the vocational track or vocational courses compared to the academic track or academic courses are less clear. Some authors do not report on it, while others find mixed results. *See* John T. Grasso and John R. Shea, *Vocational Education and Training: Impact on Youth* (Berkeley, Calif.: Carnegie Foundation for the Advancement of Teaching, 1979), finding greater or lesser effects of academic curriculum compared to vocational, depending on gender and the specific vocational field. *See* also Kenneth A. Rasinski and Steven Pedlow, "Using Transcripts to Study the Effectiveness of Vocational Education," *Journal of Vocational Education Research* 19 (3) (1994), pp. 23-43, finding that academic courses reduce dropout more than vocational courses.

[175]. Stephen Plank, *Career and Technical Education in the Balance: An Analysis of High School Persistence, Academic Achievement, and Postsecondary Destinations* (St. Paul, MN: National Research Center for Career and Technical Education, 2001), pp. vii to viii, available from: http://www.nccte.org/publications/infosynthesis/r&dreport/CTE%20in%20Blnce_Plank.pdf, accessed January 29, 2002.

[176]. David Stern, Charles Dayton, Il-Woo Paik, and Alan Weisberg, "Benefits and Costs of Dropout Prevention in a High School Program Combining Academic and Vocational Education: Third-Year Results from Replications of the California Peninsula Academies," *Educational Evaluation and Policy Analysis* 11 (4) (Winter 1989), pp. 405-416; Becky Jon Hayward and G. Kasten Tallmadge, *Strategies for Keeping Kids in School: Evaluation of Dropout Prevention and Reentry Projects in Vocational Education: Final Report* (Washington, D.C.: U.S. Department of Education, June 1995).

[177]. Crain et al.

[178]. Levesque et al., p. 57.

achievement. Generally, these studies suggest that most of the differences in academic achievement (or achievement gains) between academic and vocational students stem from their aptitude and other characteristics when entering the programs. Academic programs may have provided slightly better academic preparation than vocational programs, but the difference is small, while the general track seems to have had approximately the same impact on achievement as does the vocational track.[179] The results of the newer programs are somewhat more encouraging, suggesting that under some circumstances these programs can actually increase student achievement. Specifically, students in some of the California Peninsular Academies and the Dropout Prevention and Re-entry Projects showed improvements in academic performance relative to control or comparison groups.[180]

Educational attainment. Vocational students have traditionally been much less likely to attend college than students in academic programs. Some researchers attributed this lower rate of college attendance to the fact that students who did not plan to go to college were more likely to choose vocational education.[181] However, regression analyses, mostly using national longitudinal studies, that control for factors such as ability, background, and student aspirations, still find large differences in educational attainment between vocational and academic students.[182] According to one review of the literature, the typical student would complete about 14 years of schooling if enrolled in an academic program and about 12.5 years if enrolled in a non-academic program.[183] However, researchers have found very little difference in post-secondary education between vocational and general track students, and this difference is due mostly to pre-existing differences in background, aspirations, or attitude.[184] There is very little credible information on college attendance or completion from evaluations of newer programs. However, the evaluators of the career academies found no difference in attendance at two-year or four-year college between academy and non-academy students a year after scheduled high school graduation.[185]

Employment and earnings. Graduates of academic programs tend to earn more than graduates of vocational and general programs. These higher earnings are probably due at least partly to the higher levels of educational attainment of academic program graduates. However, these data do not tell us whether and to what extent the curriculum—as opposed to pre-existing differences among students—was responsible for these different economic outcomes. Many researchers have used statistical analysis to attempt to answer this question. Studies of the labor market results of high school

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[179]. Kulik, pp. 93-105.
[180]. Stern et al., 1989; Hayward and Tallmadge.
[181]. Kulik, p. 106.
[182]. Kulik, pp. 106-118; Arum and Shavit, 1995; Joseph G. Altonji, "The Effects of High School Curriculum on Education and Labor Market Outcomes," *Journal of Human Resources* 30 (3) (1994), pp. 409-438.
[183]. Kulik, p. 116.
[184]. Kulik, p. 117.
[185]. James J. Kemple, *Career Academies: Impacts on Students' Initial Transitions to Post-Secondary Education and Employment (Executive Summary)* (New York: Manpower Demonstration Research Corporation, December 2001), available from: http://www.mdrc.org/Reports2001/CareerAcademies/CAExecutive_Summary.pdf, accessed February 2, 2002.

vocational education using data collected during the 1970s came up with mixed or negative results, but many of these studies were methodologically problematic.[186]

Recently, more sophisticated studies have been fairly consistent in finding labor market gains from vocational education.[187] As one group of reviewers concluded, "For certain subgroups of secondary and post-secondary students, there appears to be evidence of a positive effect on wages and employment, at least in the short run, when other important individual characteristics are controlled for via statistical techniques."[188] They conclude that the strongest and most consistent finding in the literature is that "improved earnings do accrue in situations where vocational training is directly related to job tasks."[189] Even so, the effects tend to be modest. For example, one study found that a vocational concentrator will in general work about two more weeks each year than a graduate of the general curriculum, while the academic curriculum provided no advantage or disadvantage in maintaining employment relative to the general curriculum.[190] In the same study, vocational concentrators who found employment related to their training had monthly earnings that were 7 to 10 percent higher than those who followed a general curriculum, while those who pursued an academic curriculum showed no advantage.[191] Most of these studies used data on high school graduates only. Employment and earnings results might have been stronger if students who did not graduate were also included, since vocational education seems to have reduced the dropout rate.[192] However, the effects of vocational education seemed to dwindle over time, at least for some vocational graduates.[193]

One international study had some interesting results. The authors found that in nine of ten countries for which data were available, the chances of entering the labor market as an unskilled, rather than a skilled, worker were greater for those young people with academic secondary records that did not qualify for university admission

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[186]. Boesel et al., p. 135; Bishop, 1995, pp. 58-59; Mane, pp. 417-437.
[187]. Boesel et al., p. 135; Bishop, 1995, pp. 60-61; Mane.
[188]. Boesel et al., p. 135.
[189]. Boesel et al., p. 137.
[190]. Paul B. Campbell, Karen S. Basinger, Mary Beth Dauner, and Marie A. Parks, *Outcomes of Vocational Education for Women, Minorities, the Handicapped, and the Poor* (Columbus, Ohio: The National Center for Research in Vocational Education, 1986), p. 60.
[191]. Campbell et al., 1986, p. 61. *See also* Suk Kang and John Bishop, "Vocational and Academic Education in High School: Complements or Substitutes?" *Economics of Education Review* 8 (2) (1989), pp. 133-148, although criticized by some reviewers, estimating that substituting four vocational courses for four academic courses boosted total earnings during the twelve to eighteen months following graduation by 18 percent for non-college-bound male graduates and 36 percent for females; Mane, estimating that non-college-bound males from the class of 1980 who took four vocational courses earned $1,500 more in 1981, $1,100 more in 1983, and $670 more in 1985 than similar young men who took four academic courses rather than the vocational courses. Females had gains of $1,232 in 1982, $1,396 in 1983, and $1,324 in 1985.
[192]. Boesel et al., p. 137.

[193]. Paul B. Campbell, Jack Elliot, Suzanne Laughlin, Ellen Seusy, George Farkas, Lawrence Hotchkiss, and Ernst Stromsdorfer, *Dynamics of Vocational Education: Effects on Labor Market Outcomes* (Columbus, Ohio: National Center for Research in Vocational Education, 1987), p. 26; Mane, pp. 417-437.

than for those with vocational qualifications. The authors concluded:

> By focusing primarily on the process by which people gain entry to the most prestigious occupations and on the admittedly negative role of vocational education in this regard, [those who support the abolition of vocational education] fail to notice that vocational education can reduce the likelihood of unemployment and of employment in the least desirable jobs.[194]

Studies of self-contained CTE programs have yielded few useful results so far. The evaluators found no impact of career academies on employment or earnings one year after scheduled graduation, relative to the control group.[195] A review of a number of school-to-work initiatives concluded that graduates of these programs have "better labor market outcomes" than do other high school graduates. However, the reviewers used some studies that lacked comparison groups and others that had methodological problems, such as small sample sizes, low response rates, and differences between the program and comparison groups that may have affected the results.[196]

High-risk behaviors and alienation. A few studies have looked at the impact of career academies or career magnets on high-risk behaviors, such as drug use or engaging in unprotected sex. One of these studies found no effect, while another found a reduced incidence of some self-reported risk behaviors.[197] Some researchers have hypothesized that traditional vocational education programs increased students' alienation and disaffection from school. A study using data from a national survey of 15,000 students per year at five-year intervals shows that vocational students were less likely than academic students to say that doing well in school was more important for getting a good job and more likely to say that their schooling would prevent them from getting the job they desired, that their classmates would admire them if they cheated, that their friends encouraged them to do things their teachers wouldn't like, or that they had damaged school property in the last year. Moreover, differences between vocational and academic students on these indicators widened between 1976 and 1999. The author attributes this divergence in attitudes to the "marginalization and stigmatization" of some vocational programs in the 1980s and 1990s, some of which had grown out of date or become regarded as dumping grounds for poorly performing students, as well as changes in the labor market resulting in the increased value of a college degree.[198]

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[194]. Shavit and Muller.

[195]. Kemple. There was a positive impact on earnings for the medium-risk subgroup.

[196]. Katherine L. Hughes, Thomas R. Bailey, and Melinda J. Mechur, *School-to-Work: Making a Difference in Education* (New York City: Institute on Education and the Economy, Teachers College, Columbia University, 2001), pp. 27-28. *See also* Jobs for the Future and Boston Private Industry Council, *School-to-Career Initiative Demonstrates Significant Impact on Young People* (Boston, Mass: Jobs for the Future and Boston Private Industry Council, May 1998); and James Griffith and Julie Wade, *The Relation of High School Career and Technology Education to Postsecondary Employment and College Performance: A Six-Year Longitudinal Study of Public High School Graduates* (Rockville, Md.: Montgomery County Public Schools, February 7, 2001).

[197]. Kemple and Snipes; Crain et al.

[198]. David Boesel, "Student Attitudes Toward High School and Educational Expectations," paper prepared

Outcomes of work-based learning programs. Studies of the effect of work-based learning programs, a common component of CTE, have produced mixed results. A review of studies on cooperative education and other school-supervised work experience programs found no consistent association between participation in cooperative education and subsequent success in the labor market.[199] Cooperative education programs, however, vary from "well-planned learning sequences for conscientious students to hastily arranged escapes for students unengaged in school."[200] It is possible that higher-quality programs have better effects. It is also possible that cooperative education is not an intense enough intervention to have an effect by itself, even if it may serve as a useful component of an effective program. One review of evaluations of work-based learning programs (including cooperative education, youth apprenticeship, and other programs) found that work-based learning has "generally had small positive effects on students' attendance, grades, graduation rates, and participation in postsecondary education."[201] Few, however, of these evaluations included random assignment and many lacked data on large proportions of the students in the programs, so results should be viewed with caution.

Studies also indicate that students who worked while in high school are generally much more successful in the labor market than those who did not.[202] A recent school-to-work evaluation report from Mathematica Policy Research, Inc. found that the paid and unpaid internships offered through schools tend to be more diverse and offer more learning opportunities than jobs students find on their own. They also found that "students generally find internships and job-shadowing experiences helpful in clarifying career goals.[203] These results suggest that well-designed work-based learning programs could have a positive impact on students' future labor market success.

Synthesis

In general, these studies tell a story of modest reductions in dropout rates and modest improvements in labor market performance for those students who took vocational courses or concentrated in vocational education. However, most of the studies, especially those using large databases, group together programs of different levels of quality, intensity, and coherence. Some studies attempt to assess the impact of one course, even though effectiveness might depend on reaching a certain "critical mass" of courses. Even when the effect of "concentrating" in vocational education is

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for the annual meeting of the American Educational Research Association, Seattle, Wash., April 2001.

[199]. David Stern, Neal Finkelstein, James R. Stone III, John Latting, and Carolyn Dornsifel, *School to Work: Research on Programs in the United States* (London: The Flamer Press, 1995), pp. 18-20.

[200]. U.S. Congress, Office of Technology Assessment, *Learning to Work: Making the Transition from School to Work* (Washington, D.C.: Office of Technology Assessment, 1995), p. 68.

[201]. U.S. Congress, Office of Technology Assessment, pp. 60-61.

[202]. Bishop, 1995, pp. 70-71.

[203]. Joshua Haimson and Jeanne Bellotti, *Schooling in the Workplace: Increasing the Scale and Quality of Work-Based Learning* (Princeton, N.J.: Mathematica Policy Research, Inc.: January 22, 2001), pp. xii-xiii, available from: http://www.mathematica-mpr.com/PDFs/schooling.pdf, accessed February 2, 2002.

measured, a concentration may not mean that student had a coherent sequence of classes leading to a competency in general or in a particular occupational field. Moreover, the quality of past vocational education programs has varied greatly, and has often been less than one might desire. Some of the newer studies, such as the California Peninsular Academies study, suggest that there are great differences in outcomes between individual programs, which suggests that higher-quality programs might produce better outcomes. Moreover, most of the studies did not assess the impacts of vocational education for different subgroups of students, and the modest results might be masking more impressive gains for some students.

Research suggests that traditional vocational education reduced college attendance and perhaps slightly reduced academic achievement compared with the academic track. This may not be surprising in light of traditional vocational education's focus on preparing young people for immediate employment. However, there are suggestions that some newer stand-alone programs may improve students' achievement levels without reducing college attendance. The lack of rigorous evaluations of modern programs is a serious problem. More and better evaluations are needed before we can understand the impact of these programs.

Rethinking the Federal Role

The federal role in CTE is very limited. Federal funding provides only a small proportion of the funds that support CTE around the country. Therefore, we recommend that the federal government concentrate on funding research that could inform state education departments and local school districts on questions of how to best provide CTE.

The Perkins Act is the main source of federal funding for CTE at the high school level, although it funds post-secondary CTE as well. Currently funded at $1.5 billion per year through 2003, the federal Perkins Act probably provides less than 10 percent of national spending on CTE at all levels, although no figure for total spending is available.[204] Congress has attempted to use this small amount of funds to generate change in CTE by imposing requirements on state and local programs (such as a requirement to provide an understanding of "all aspects of an industry"), requiring that a certain proportion of funds be spent for specific purposes (for example, on "gender equity" programs), setting aside funds for disadvantaged groups or other purposes, and requiring states to provide data on performance. Through the federally funded National Research and National Dissemination Centers for Career and Technical Education, the U.S. Department of Education's Office of Vocational and Adult Education (OVAE) sponsors research and development activities in CTE.

With its small share of total CTE spending, the federal government is not in a

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[204]. Richard N. Apling, *Vocational Education: The Carl D. Perkins Vocational and Technical Education Act of 1998* (Washington, D.C.: Congressional Research Service, January 11, 1999), p. 3.

strong position to influence the size and shape of programs at the local level.[205] The federal government could potentially play a more important role, however, by sponsoring high-quality research, disseminating the results, developing curricula and other materials to be used by schools nationwide, and providing technical assistance. Building on the efforts of the National Research and National Dissemination Centers for Career and Technical Education, OVAE could play a major role in shaping the direction of the field in the twenty-first century.

Many crucial questions remain about what works in CTE and how programs should be retooled to meet the needs of a new century. Here are some of the most important:

- *How effective is CTE as an alternative to other options for different groups of young people?* Most studies of the effectiveness of CTE have major methodological flaws and/or are out-of-date. We need better studies testing different models of CTE for different types of young people.

- *In what settings should CTE be provided? What mix of comprehensive high schools, programs within schools, or free-standing vocational schools makes sense? Should CTE be provided as part of a broader high school reform?* We do not know much about the relative effectiveness and costs of different settings for providing CTE, and yet such information is important for determining how to make CTE programs most effective. Some experts argue that we must restructure large comprehensive high schools in order to reduce dropout rates. They stress that large high-poverty high schools require organizational, instructional, and teacher support reforms. Reforms of any one component, such as curriculum, will not be enough.[206] Richard Lynch—who interviewed representatives from business and industry, professional education associations, and public schools to develop a paper about the future of CTE—reported that nearly every individual or group he interviewed "commented that it is insufficient to reform only vocational education into a new CTE without major changes in public schools, especially high schools."[207] The career academy is one of several approaches that combine a vocational focus with other educational reforms. But there are few good evaluations of the effects of these approaches, and more are needed.

- *For whom should CTE be designed: the most at-risk students, those who are not college- bound, or also for some students who may be college-bound? And how rigorous should the curriculum be?* Some experts advocate that CTE be targeted primarily to the students who are educationally disadvantaged, will probably not attend college, and need extensive job training to enter the labor market on

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[205]. *But see* Lynch, p. 9.

[206]. McPartland and Jordan, pp. 15-16.

[207]. Lynch, p. 36.

graduating high school as well as for those students who do not do well in traditional schools and are at risk of dropping out. Others advocate targeting CTE toward the broader group of high school graduates who are not college-bound. Still others want to use vocational subject matter to teach traditional academic content—to everyone.[208] On one hand, recruiting better students might improve the quality, rigor, and reputation of CTE. Some researchers note that new, more challenging vocational programs combining occupational and academic studies seem to bring CTE "into the mainstream of the high school curriculum, engaging a broader cross-section of the student population."[209] On the other hand, one major rationale for spending public funds on CTE is to help prevent at-risk youth from becoming disconnected from the labor force and mainstream society. And a more rigorous curriculum might cause such students to drop out.[210] Researchers found that students in New York City career magnet schools had lower graduation rates than those in comprehensive high schools and hypothesized that the magnets tended to push out weaker students.[211]

- *Should training be structured around broad industry areas or specific occupations?* Proponents of an updated CTE have advocated structuring programs around broad industry areas rather than specific occupations, arguing that, in the new economy, workers will need to change jobs and duties over the course of their careers.[212] This trend suggests a focus on "all aspects of an industry," which has been incorporated into the Perkins Act. Some school systems are starting to use a new concept called "career clusters," which are broad occupational categories encompassing a variety of careers. Several states have developed education targeted to different career clusters. The U.S. Department of Education has identified sixteen clusters, including health science, information technology services, and manufacturing, and has developed information and materials for some of the clusters, while the National Association of State Directors of Career Technical Education Consortium is developing a curriculum framework, assessment system, and certification system for each of the remaining clusters.[213] The question is, when training is around broad industries instead of specific jobs, whether students acquire the skills that they need in order to be attractive to employers.[214]

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[208]. Lynch, pp. 16-17.
[209]. Delci and Stern, p. 34.
[210]. Boesel et al., p. 101.
[211]. Crain et al.
[212]. *See, e.g.*, Boesel and McFarland, p. 16.
[213]. Michael E. Wonacott, *Career Clusters* (Columbus, Ohio: National Dissemination Center for Career and Technical Education, 2001), available from: http://www.nccte.org/publications/infosynthesis/highlightzone/highlight06/highlight06-careerclusters.pdf, accessed January 31, 2002.
[214]. Paula Hudis, *Making Schools Career-Focused* (Princeton, N.J.: Mathematica Policy Research, Inc., 2001), p. 31, available from: http://www.mathematica-mpr.com/PDFs/makingschools.pdf, accessed February 2, 2002.

- *To what extent is outdated curriculum still a problem? In an era of fast technological change, how can schools deal with obsolescence of curriculum?* According to one recent report on the state of CTE, many programs are outdated and no longer relevant to the workplaces for which they are supposed to prepare students.[215] In order to ensure that students obtain training-related jobs, training must reflect existing job opportunities. Schools should identify outdated programs and eliminate or refocus them. Ways for keeping curriculum up-to-date need to be identified and disseminated.

- *How can high schools attract and retain a good CTE faculty? Do teaching methods and teacher training need to be updated? What credentials should teachers be required to have?* More research needs to be done on how schools in the United States and in other countries attract and retain good CTE faculty. One report sees a "dramatic" shortage of career and technical teachers in most subject areas in the United States.[216] Moreover, many educators argue that career and technical teaching methods need updating to accommodate changes in the economy, which require students to be prepared for broader and changing occupational roles. Others cite the need for changes in teacher training to incorporate new knowledge about how students learn, a greater focus on academic skills, an increasing proportion of career and technical students with special needs, an increasing emphasis on work-based learning, and a new trend toward preparation for a cluster of related occupations as opposed to a single occupation.[217] Traditionally, vocational teachers have had less formal education and more work experience (outside of teaching) than other secondary school teachers.[218] A recent report recommends changes in CTE licensure and teaching, including requiring all teachers to have a bachelor's degree to be permanently certified, and changes in teacher education to include training in the teaching of academic subjects, education of special needs students, supervision of work-based learning, and "workforce education and career development theory and practice."[219] However, it is not clear that anyone has studied classroom teachers to determine whether the more effective teachers are really those that have these qualifications and training.

- *What should be the role of work-based learning opportunities, such as internships or apprenticeships?* Supporters of work-based learning argue that it

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[215]. Lynch, p. 16.

[216]. Kenneth Gray and Richard A. Walter, *Reforming Career and Technical Education Teacher Licensure and Preparation: A Public Policy Synthesis* (Columbus, Ohio: National Dissemination Center for Career and Technical Education, 2001), available from: https://www.nccte.org/publications/infosynthesis/infopaper/infopaper01/infopaper01.pdf, accessed January 30, 2002.

[217]. Robert G. Berns and Patricia M. Erickson, "Contextual Teaching and Learning: Preparing Students for the New Economy," *The Highlight Zone: Research@Work* 5, 2001, available from: http://www.nccte.org/publications/infosynthesis/highlightzone/highlight05/highlight05-CTL.pdf, accessed March 5, 2002; Lynch, pp. 59-66; Gray and Walter, p. viii.

[218]. Boesel et al., pp. 64-66.

[219]. Gray and Walter, pp. ix-xi.

helps students see the connection between what they are learning in school and how it is used in the "real world" and seems to result in a "deeper" understanding of the subject matter.[220] Moreover, for students who are making the transition from school to work, work-based learning can provide crucial employment references. As mentioned earlier, there is mixed evidence on the impact of work-based learning. More evaluations are needed to identify the effectiveness of different types of work-based learning opportunities as well as the optimal length and intensity of the experience.

- *What is the appropriate role for high school "Tech Prep" programs—instruction coordinated with community and technical college programs?* High school CTE programs that are articulated with community college programs provide a coherent program spanning secondary and postsecondary schools and enable students to continue on to post-secondary education. In interviewing business and education representatives, Richard Lynch found widespread support of Tech Prep "as a conceptual and structural model for high school CTE reform."[221] However, reliable data are lacking on the impact of Tech Prep on students.[222] Interim data from a longitudinal study of Tech Prep participants and comparison groups one to three years after high school graduation suggests some increases in college attendance and work, but low response rates and the procedures the researchers used to select the comparison group limit the usefulness of this study.[223]

- *How can the coherence of CTE be increased?* The Perkins Act requires school districts to provide "a coherent sequence of academic and vocational courses." But the 1994 NAVE reported that only a third of school districts require that a student take a sequence of vocational courses to be considered a vocational program completer.[224] Career academies and other schools that focus on a specific occupational theme can provide students with a coherent career-related education. Studies should look at other ways in which school systems, both here and abroad, are providing a coherent sequence of courses to career and technical students.

- *To what degree do tougher academic standards and testing discourage participation in CTE? Should consideration be given to adjusting these standards and tests for CTE students?* As mentioned earlier, the increasing emphasis on standards and assessment may put at risk some of the most promising CTE

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[220]. Lynch, p. 67.
[221]. Lynch, p. 79.
[222]. Lynch, p. 82.
[223]. Debra D. Bragg, *Promising Outcomes for Tech Prep Participants in Eight Local Consortia: A Summary of Initial Results* (St. Paul, Minn.: National Research Center for Career and Technical Education, 2001), available from: http://www.nccte.org/publications/infosynthesis/r&dreport/Promising%20Outcomes.pdf, accessed January 31, 2002. The comparison groups were matched to the program groups on academic performance, which limited the researchers' ability to measure the effect of Tech Prep on secondary-level outcomes such as dropouts, graduation, and academic attainment, as described on page 10.
[224]. Boesel et al., p. 86.

programs, such as career academies. Future research might attempt to assess the effects of standards on students' curricular choices. Demonstration projects could assess the feasibility and effectiveness of replacing some academic tests with vocational assessments. Such assessments "might include >scores' or evaluative commentary from portfolios, demonstrations, oral and written reports, work-based activities, student productions, term papers or projects, essays, student critiques of literary and technical work, paper-and-pencil tests, employers' and teachers' formal and informal observations, [and] case study analyses."[225] In addition, researchers could investigate the use of exams and nationally recognized certificates awarded by expert groups.[226]

- *How can the poor image of CTE be improved so that students, parents, and teachers see it as a viable option to prepare for a good career? How can school counselors be encouraged to be more supportive of CTE?* Essentially, there are two—not mutually exclusive—ways to respond to the identification of CTE with non-college-bound youth. One approach is to educate parents and students about the evidence indicating that college is not the best route to success for every student. In their book, *Other Ways to Win*, Kenneth Gray and Edwin Herr outline a comprehensive strategy to reform guidance practices and inform parents about their children's readiness (or lack thereof) for post-secondary education.[227] This strategy includes the development of an individual career plan for all students by the tenth grade. Through a parent involvement strategy including meetings, participation in development of the career plan, provision of feedback at "strategic times," and the provision of opportunities for individual assistance, parents are to be informed of the low odds of success for most students who enter college and the "other ways to win," such as pursuing high-paid technical careers.
    - Another approach is to try to define CTE as an alternate route to college and to connect it with the ideas of high standards and rigorous academics.[228] It may be possible to adopt both approaches, informing people of the good jobs available without college, high college costs and dropout rates, and also that CTE can lead to post-secondary entrance and completion. Research is needed to better understand public opinion on career and technical education, determine what the main misconceptions are, and assess different strategies for changing opinion.

- *What proportion of CTE graduates find training-related jobs? How can training-related job placements be increased and linkages between schools and employers be improved?* The literature indicates that the benefits of CTE depend on whether graduates find jobs related to their training. Yet, as mentioned earlier, less than half of vocational graduates were working in jobs related to their curriculum in 1985Bthe most recent year for which data are available. We need

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225. Lynch, pp. 73- 74; Kemple and Snipes, p.12.
226. Bishop, 1995, pp. 73-80, 85.
227. Gray and Herr.
228. A-Plus Communications and Jobs for the Future, p. 14.

to update these data in order to determine the extent of the problem, and then we need more research on how training-related placements can be increased. The literature reviewed by John Bishop suggests that a number of factors are related to the ability to find training-related jobs, including the time teachers spend on placement and the involvement of employers.[229] Eliminating outdated curricula is clearly important, as described earlier. James Rosenbaum has documented the way some American vocational teachers, as well as Japanese schools, work with employers to place vocational students in good jobs. More research should be done on how some teachers and schools, both here and abroad, link their students with employers and jobs and how these approaches could be adapted more widely.

Conclusion

The "college for all" myth is shortchanging those young people who are either uninterested in or unsuited for college. CTE has the potential to create a better future for these young people. Getting schools to pursue this potential, however, will not be an easy task. As one author puts it: "Unfortunately, policy is now moving in the wrong direction. Perpetuating the college-for-all myth, schools are de-emphasizing employers' needs, reducing vocational education, and retiring vocational teachers who have employer contacts. These are terrible losses."[230] The federal government can lead the way through research and demonstration programs that help identify the needs of America's non-college-bound youth and help shape the response of its educational institutions.

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[229]. Bishop, 1995, p. 66.
[230]. Rosenbaum, p. 279.

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